2.0 Description of the Proposed Action and Alternatives

This section of the EIS describes the alternative courses of action that the DEQ, as the lead agency under MEPA, is considering in its evaluation of the proposals brought forward by CES and MPC. In alternatives analysis, DEQ is required to consider in detail, only those alternatives that are realistic, technologically available, and that represent a course of action that bears a logical relationship to the proposal being evaluated. Numerous operational and location alternatives to the project sponsor proposals were identified for evaluation. All but three of the alternatives were eliminated from further consideration for analysis because they were found to be unreasonable based on the selection criteria for detailed analysis listed below.

- Actions that meet the purpose of the Proposed Action
- Facility locations that minimize environmental impacts
- Facility locations practicable for the purpose of delivering natural gas or generating electricity
- Adequate water supply to meet generation plant process needs
- Actions that do not conflict with local resource management plans
- Actions that are not feasible

This chapter describes the three alternatives selected for detailed analysis in this EIS (Sections 2.1, 2.2, and 2.3) and alternatives eliminated from further consideration (Section 2.4). Alternatives selected for detailed study are:

- The Proposed Action includes the granting of DEQ permits and licenses described in Section 1.1 and the resultant construction and operation of the Project as described by the project sponsors (CES and MPC).
- The Proposed Action with additional construction and operational management practices designed to mitigate impacts from the Proposed Action.
- The No Action Alternative describes activities that would be expected to take place if the Proposed Action did not occur.

Section 2.4 provides descriptions of alternatives that were examined but eliminated from detailed study.

2.1 Proposed Action

The Proposed Action includes the granting of DEQ permits and licenses described in Section 1.1 and the resultant construction and operation of the Project as described by the project sponsors (CES and MPC). This section summarizes the Project as proposed by the project sponsors that would result from implementation of the proposed action. Figure 1-1 presents an overview of both portions of the Project including the generation plant and pipeline upgrades. Unless otherwise cited, sources for a description of all proposed project activities are the original project sponsor submittals. For all proposed generation plant activities, the original project sponsor submittals are an application submitted to DEQ January 31, 2001 (CES 2001a) under the Montana Major Facility Siting Act and subsequent modifications submitted March 30, 2001 (CES 2001b), and the MPDES wastewater discharge application submitted June 11, 2001 with subsequent modifications (CES 2001c). For all proposed pipeline activities, the original project sponsor submittal includes descriptions of the proposed pipeline project received August 21, 2001 (MPC 2001a). Subsequent clarifications and changes in the proposed projects by CES or MPC are cited as such in this section.

2.1.1 Continental Energy Services Proposed Generation Plant

CES proposes to construct a natural gas-fired combustion turbine generation plant and related facilities in western Montana. The Silver Bow Generation Plant (generation plant) would be located approximately five miles west of downtown Butte, Montana in Butte-Silver Bow County in the northeast quarter of Section 35, Township 3 North, and Range 9 West (Figure 2-1). The generation plant would be built on a 20-acre parcel northeast of the Advanced Silicon Materials LLC (ASiMI) facility within the Silicon Mountain Technology Park. The Technology Park falls within the boundaries of an industrial district established by Butte Silver Bow as Tax Increment Financing District Number 2 (TIFID).

The generation plant would provide power for sale to customers in the Western Systems Coordinating Council (WSCC) power market, which could include potential customers in Montana and existing and future Silicon Mountain Technology Park industries. The total estimated cost of the generation plant and transmission line is approximately $300 million. In addition to the generation plant, CES proposes to construct and operate the following associated facilities:

- Approximately 0.6 mile of new water line in the Silicon Mountain Technology Park tapping the existing Technology Park 30-inch water line (Figure 2-1)
- Approximately 0.5 mile each of three new 161kilovolt (kV) electric power lines to connect the to the MPC electricity grid system via the ASiMI Substation (Figure 2-1).

The proposed power producing components of the generation plant would be two F-technology Siemens-Westinghouse gas turbines and a matched steam turbine unit. CES proposes to contract with Duke/Fluor-Daniel, a United States based engineering and design company that specializes in the construction and operation of power generation plants. A visual simulation of the proposed plant as built is provided in Figure 2-2.

Figure 2-1 Generation Plant Location

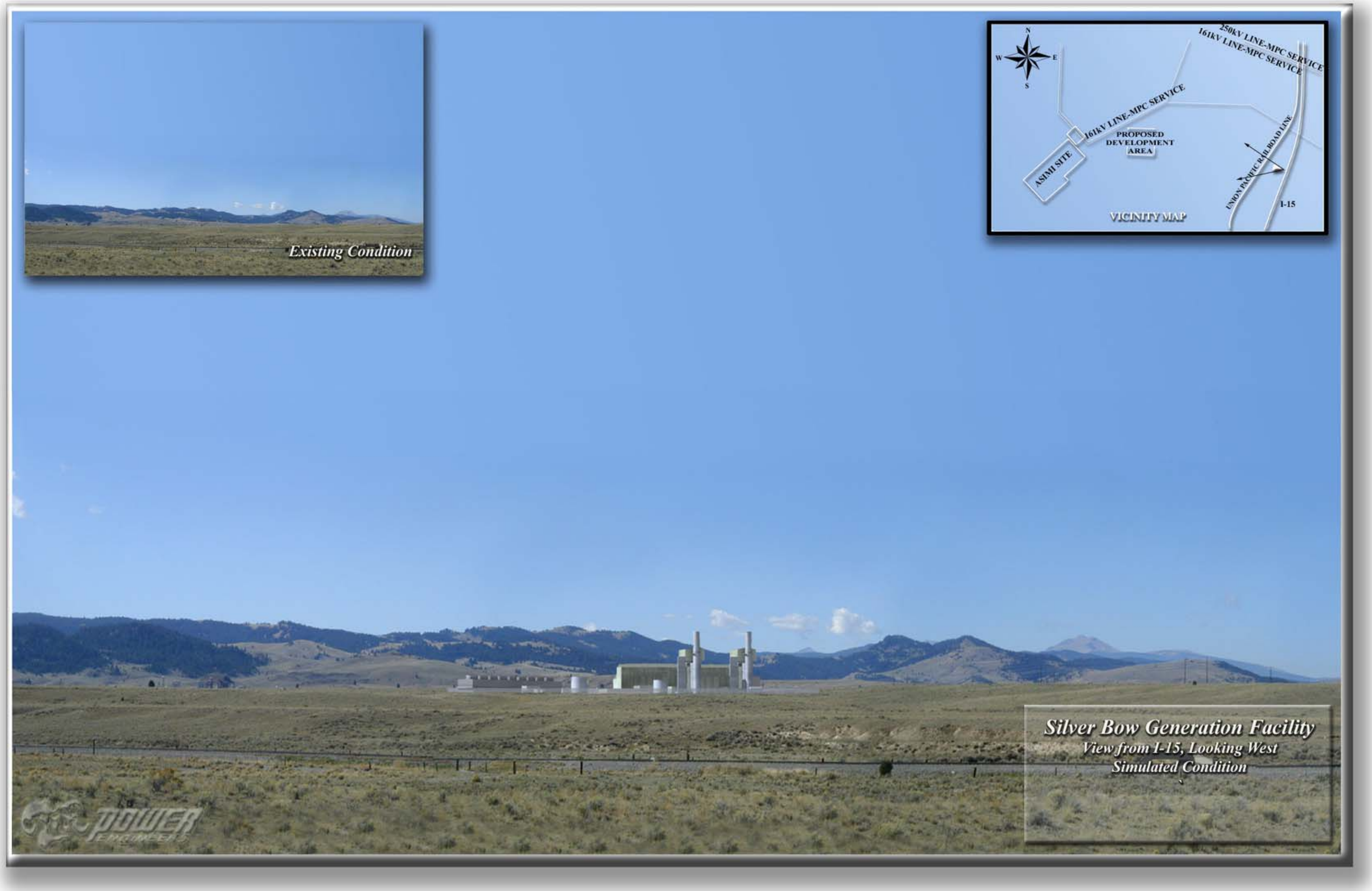


Figure 2-2 Visual Simulation of the Generation Plant

CES proposes to construct a combined cycle 2-on-1 power plant designed to generate nominally 500 MW of electrical capacity year round on a 24-hour basis except during planned maintenance outages. The generation plant would be constructed in accordance with American Standards of Mechanical Engineers (ASME) for power plants and the National Boiler Board Rules. American National Standards Institute (ANSI) standards and steel construction standards would be adopted for structural, tank and concrete work. CES proposes to adhere to state and federal building codes and standards and local industrial requirements. Fire and safety codes would be adhered to for the affected sections of the National Fire Protection Agency (NFPA) concerned with various fire classifications. Occupational Safety and Health Administration (OSHA) standards would be strictly adhered to as regarding power plant operations. Electricity transmission would be constructed in conformance with National Electrical Safety Code standards.

2.1.1.1 Power Block Description

The Plant's major components include three turbine generator units, two Heat Recovery Steam Generators (HRSGs, also referred to as boilers), administration offices, control room, warehouse, shop, water and wastewater treatment system, two stacks with emissions control equipment, cooling tower, and transformers. The turbine generator units, offices, control room, warehouse, shop, and water treatment equipment would be enclosed in one building. Components such as the cooling tower, water and de-mineralized water storage tanks, pipeline terminus and metering station, a wastewater treatment pond, and a storm water detention pond would be located outside the building complex. A site arrangement plan depicting all facilities is shown on Figure 2-3.

Water tanks and the exhaust stack would be located on the east side of the building and transformers/electrical interconnection would be located on the west side for safety concerns. The exhaust stacks would be approximately 160 feet tall (POWER Engineers [POWER} 2001a). The cooling tower would be located on the south side of the building in a west-to east orientation with a gas metering station and a storm water detention pond on the north side of the building.

The HRSGs would be located partially inside a building to provide freeze protection during low load or outage periods and to mitigate the impact of noise emission on the surrounding neighborhood. Atmospheric vents and silencers would be provided for use during startup and abnormal operations.

2.1.1.1.1 Process Description

The power block of the two-on-one combined-cycle facility would be composed of two combustion turbines, two HRSGs, one steam turbine and three power generators, one driven by each of the turbines. A combination of a turbine and its dedicated power generator is referred to as a turbine unit. A combined-cycle facility generates electricity using the combustion turbine unit's initial combustion of the fuel, and then recycling heat energy contained in the exhaust to generate additional electricity in the steam turbine unit. An estimated heat balance summary for the combined-cycle performance at the average annual temperature is provided in Appendix C.

Figure 2-4 provides a conceptual diagram of the Combined Cycle Process showing the major components of the proposed power island and the general flow of energy. Within each combustion turbine unit, a mixture of compressed air and natural gas would be fired in the combustor to produce compressed hot gases. Expansion of these gases in the turbine would rotate the turbine shaft, turning a generator to produce electricity. The project would be equipped with the best available control technology (BACT) in order to control air emissions. Air emission control would be provided by the use of dry low nitrogen oxide (NO_x) combustors and a selective catalytic reduction (SCR) installed in the HRSG.

Two HRSGs (boilers) would be used, one for each combustion turbine generator (CTG). Each HRSG would have a two-pressure level design equipped with a reheat section. The high pressure (HP) portion of the HRSG would include economizer, evaporator, and superheater sections sized to meet steam generation requirements. HP steam produced by the HRSGs would be routed to the steam turbine where it would expand to rotate the turbine shaft, which would turn a generator to produce additional electricity. The HP turbine exhaust would be reheated to near the main steam temperature in the HRSGs and then admitted to the low pressure steam turbine. Low pressure (LP) steam would be produced in the HRSG and combined with the reheat and admitted to the low pressure turbine.

Upon exiting the turbine, steam would cool and condense via re-circulating water passing from the cooling towers to the condenser by the circulating water system. Condensate pumps and boiler feed pumps then would return the condensate in a closed cycle through the HRSG, steam turbine, and condenser. Condensate is continuously recycled and not discharged as wastewater. The circulating water system utilizes a cooling tower to dissipate heat from the process of condensing steam to condensate. An average of 2,675 gallons per minute (3.5 million gallons per day) of water would be used to operate the cooling process.

2.1.1.1.2 Efficiency-Enhancement Practices

CES proposes three output-enhancing practices (duct burners, steam injection and evaporative cooling) to the generation plant to improve electricity generating efficiency. Output-enhancing practices would offset the loss of efficiency typically experienced during summertime generation due to higher ambient temperatures. Burners built into the ductwork of the HRSGs would burn additional natural gas in the HRSGs. This would boost steam production, which in turn would boost steam turbine output. Adding duct firing capability would also enable the plant to produce more electric capacity at lower incremental capital cost. The addition of steam to the combustionturbine would increase mass flow through the turbine. Increasing the mass flow would increase electric output of the connected generator. The steam used in steam injection would be routed from the HRSG. Evaporative coolers contain a wet media through which the compressor inlet air would be passed. Evaporative cooling with 100% efficiency reduces the inlet air to the wet bulb temperature by removing heat with evaporation. Decreasing the inlet temperature on warm days would increase air density, thereby increasing mass flow through the turbine. Increasing the mass flow through a combustion turbine would increase power output of the turbine. When the ambient temperature is above approximately 60 degrees, evaporative coolers are considered to be an effective and inexpensive way to boost turbine output.

Combustion turbine generator exhaust gas flow-rate, temperature, and emission levels would change depending on operational mode, and the steam turbine generator power output would change accordingly. The optimum mode for a given time period would depend on power demand and ambient conditions.

2.1.1.2 Additional Major Plant Systems

In addition to the combustion turbine generators and the steam turbine generator, CES proposes to employ the following major systems in the generation plant:

Heat Rejection System

- Condenser
- Circulating Water Pumps
- Cooling Tower

Pollution Control Equipment

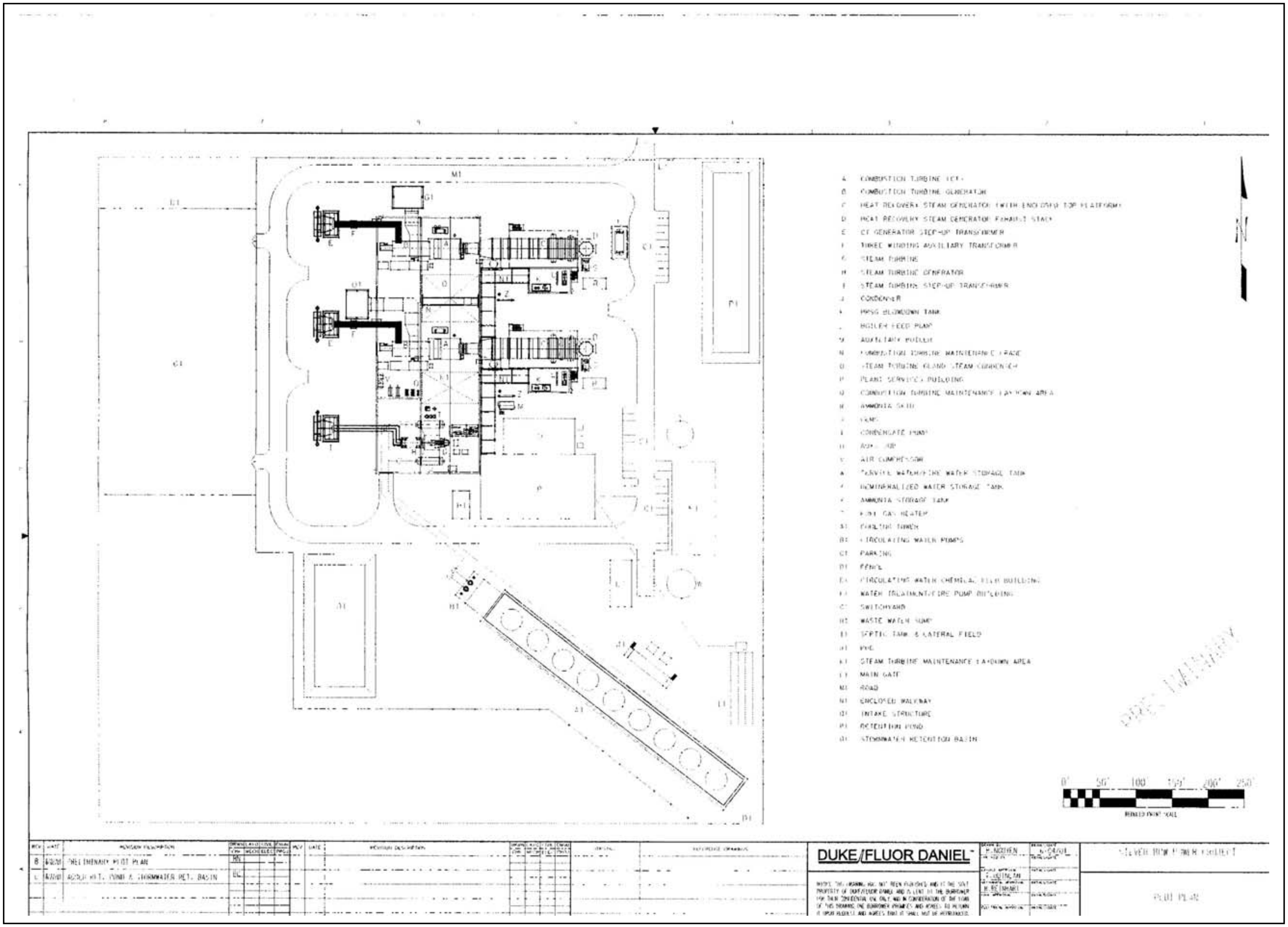
Selective Catalytic Reduction (SCR)

Feed water System

- Condensate Pumps
- Boiler Feed water Pumps

Water/Wastewater Treatment System

- Water Pretreatment
- Polishing mixed bed de-mineralizer
- Acid Storage Tank
- De-mineralized Water Tank
- Chemical Feed Equipment
- Service/Potable Water Distribution System
- Reverse Osmosis (RO) unit
- Fire/Service Water Tank
- Wastewater discharge systems



A COMBUSTION TURBINE
B COMBUSTION TURBINE GENERATOR
D HEAT RECOVERY STEAM GENERATOR EXHAUST STACK
E CT GENERATOR STEP-UP TRANSFORMER
F THREE WINDING AUXILIARY TRANSFORMER
G STEAM TURBINE
H STEAM TURBINE GENERATOR
I STEAM TURBINE STEP-UP TRANSFORMER
J CONDENSER
K HRSG BLOWDOWN TANK
BOILER FEED PUMP
AUXILIARY BOILER
P PLANT SERVICES BUILDING
R AMMONIA SKID
CONDENSATE PUMP
AIR COMPRESSOR
SERVICE WATER/FIRE WATER STORAGE TANK
DEMINERALIZED WATER STORAGE TANK
AMMONIA STORAGE TANK
FUEL GAS HEATER
COOLING TOWER
CIRCULATING WATER PUMPS
C1 PARKING
D1 FENCE
WATER TREATMENT/FIRE PUMP BUILDING
SWITCHYARD
WASTE WATER SUMP
SEPTIC TANK & LATERAL FIELD
STEAM TURBINE MAINTENANCE LAYDOWN AREA
MAIN GATE
M1 ROAD
N1 ENCLOSED WALKWAY
INTAKE STRUCTURE
RETENTION POND
STORMWATER RETENTION BASIN
0' 50' 100' 150' 200' 250'
DUKE/FLUOR DANIEL
PRELIMINARY PLOT PLAN
PLOT PLAN

Combined Cycle Process

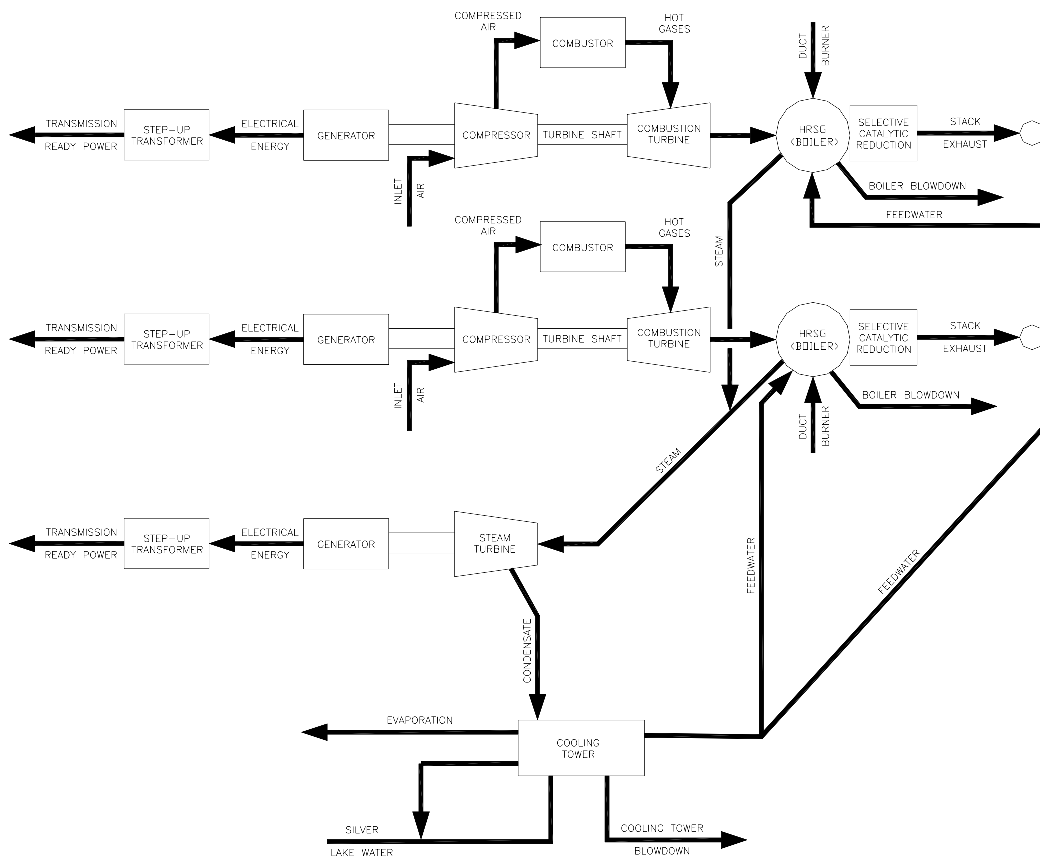


Figure 2-4 Conceptual Diagram of the Combined Cycle Process

Electrical System

- Steam Turbine Generator Step-Up Transformer
- Combustion Turbine Generator Step-Up Transformers
- Station Service Transformer
- Secondary Unit Transformer(s)
- Switchgear
- Motor Control Centers
- Battery Equipment

Instrument and Controls System

- Plant Instrumentation and Controls
- Distributed Control System
- Continuous Emissions Monitoring Equipment

Fuel System

Natural Gas Conditioning Equipment

Auxiliary Systems

- Auxiliary Boiler
- Compressed Air Equipment
- Fire Protection Equipment
- Closed Cycle Cooling Water Equipment
- Building
- Equipment Area
- Control Room Area
- Warehouse Area
- Maintenance Area
- Administration Area
- Maintenance Crane

2.1.1.3 Major Equipment Descriptions

CES proposes to incorporate the following major equipment in the facility design.

- Two Siemens Westinghouse Power Corporation (SWPC) 501FD combustion turbine generators with power augmentation capability
- Two triple pressure heat recovery steam generators (HRSGs) with inlet duct, duct burner, ammonia injection grid, SCR catalyst, and interconnecting piping, and sized for 100 percent of the combustion turbine exhaust flow at worst case ambient conditions.
- One reheat, condensing type steam turbine generator sized for the total steam flow of the two HRSGs under maximum duct firing and worst case ambient conditions.
- One full capacity, constant speed, multi-stage, motor driven, high-pressure, boiler feed pump for each HRSG sized for 100 percent of the total design basis feed water flow per HRSG at worst case ambient conditions.
- Two full capacity air compressors, coalescing filters, one full capacity air receiver, and a full capacity, heatless, dual tower, self-regenerative, desiccant type air dryer to supply the compressed air requirements for the plant. These requirements include providing instrument and utility air for all plant users at adequate pressures and flow rates.
- Two full capacity, two-stage, water sealed, liquid ring condenser exhauster system vacuum pump units.
- Two full capacity closed cycle cooling water pumps sized to accommodate the required flow through one of the two full capacity plate and frame type closed cycle heat exchangers.
- Two full capacity condensate pumps sized to accommodate the total plant design flow rate.
- One surface condenser sized based on a 75 percent cleanliness factor to condense exhaust steam from the steam turbine.
- One wood, multi-cell, mechanical draft, counterblow cooling tower sized for full plant load steam cycle heat rejection under worst-case ambient conditions.
- Two half capacity vertical circulating water pumps sized for the total plant design flow rate.
- Two full capacity condensate makeup pumps.
- One fuel gas scrubber and one fuel gas filter/separator, one electric fuel gas heater for startup and initial operation of each combustion turbine, and a shell and tube water to gas fuel gas preheater for each combustion turbine, all sized for the manufacturer’s minimum requirements for superheat temperature and for performance enhancement of the combined cycle unit during normal operation.
- A steam turbine lube oil system with lube oil purifier and transfer pump.
- A complete fire protection system including a combustion turbine fire protection and detection system. The fire protection system that would be in accordance with NFPA 850 and includes dry-pipe systems for the steam turbine lube oil and the cooling tower, deluge systems for large critical transformers and an underground fire loop with hydrants around the site. A motor driven, a diesel engine driven, and a pressure maintenance firewater pump and their associated controllers would also be included. The service/fire water storage tank would

serve as the primary supply source of firewater. The secondary supply source of firewater would be from the reserve firewater tank.

- Field erected tanks as described below:

Tank	Quantity	Capacity
Service/Fire Water Storage Tank	1	1,400,000 gallons
Demineralized Water	1	100,000 gallons
Reserve Fire Water Tank	1	300,000 gallons
Anhydrous Ammonia	1	10,000 gallons

- Miscellaneous pumps as described below:

Pump	Quantity
Demineralized Water Pumps	2
Service Water Pumps	2
HRSG Blowdown Sump Pumps	2
Backwash Water Sump Pumps	2
Wastewater Transfer pumps	2

- Shop Fabricated Tanks as described below:

Tank	Quantity
Acid Storage	1
HRSG Blowdown	2
Fuel Gas Drains	3
Water Wash	2
Closed Cycle Cooling Water Head Tank	1

2.1.1.4 Electrical Power Output and Powerlines

The electrical power output of any combustion turbine unit is dependent upon ambient atmospheric conditions. Generally, the colder the outside temperature, the greater the electrical output from the combustion turbine units. Approximately one third of net plant output would be provided by each of the two combustion turbine units. The balance of the net output, approximately one third of the total, would come from the steam turbine unit. While the nominal output of the generation plant is stated as approximately 500 MW, on warmer summer days the net plant output would be somewhat less than 500 MW. On cold days the net plant output would be somewhat greater than 500 MW.

Electrical power generated by the facility would be transmitted by three 0.5-mile 161kV powerlines that would extend from the generation plant to a substation located at the ASiMI facility (Figure 2-5). The ASiMI Substation is connected to an electric power transmission system operated by MPC. The potential purchasers of electricity generated by the proposed Silver Bow Generation Project are power distributors and industrial customers throughout the western United States.

2.1.1.5 Fuel Supply to the Proposed Generation Plant

The generation plant would require a firm fuel supply of approximately 85 million cubic feet (MMCF) per day of transmission quality natural gas delivered to the facility at 500 pounds per square inch gauge (psig). The natural gas fuel would be delivered to the site via an underground fuel gas pipeline approximately 17.6 miles (the Morel Tap). Once inside the facility, the gas pressure would be controlled using a gas pressure regulating station and metered for consumption and billing purposes. The gas would then be conditioned using a fuel gas scrubber and filter/separator to remove impurities and condensate prior to entering the combustion turbines.

Fuel gas scrubbers are vertical, cylindrically shaped, carbon steel pressure vessels, designed to collect the largest quantity of liquids and particulates expected to flow through the fuel gas supply line via centrifugal action. The filter/separator would be sized to meet the combustion turbine and burner manufacturers' fuel gas cleanliness criteria during all operating conditions, such as cold startup, hot startup, partial load, and full load. A coalescing filter would be used as the final separation and filtration element before the natural gas goes to the combustion turbine. CES proposes to use a shell and tube water-to-gas fuel gas preheater for each combustion turbine to meet the combustion turbine manufacturer's minimum requirements for superheat temperature and for performance enhancement of the combined cycle units during normal operation. An electric fuel gas heater would be used for startup and initial operation of the combustion turbines. These facilities would be located outdoors, but within the generation plant fence line. No on-site storage of fuel gas is anticipated.

CES assumes that the heat content of the fuel gas would be approximately 21,500 Btu per pound of gas (Btu/lb) on a high heating value basis. The maximum total plant fuel consumption rate is estimated to be 215,600 pounds per hour, assuming maximum output on the coldest day of the year. Actual heat content of the fuel gas would vary depending upon the source of gas provided. Actual measured heat content for interstate-pipeline quality gas is typically within the range of 20,000 to 23,000 Btu/lb. The maximum consumption rate stated above would be for peak operation at extreme condition. Actual fuel utilization would vary daily and seasonally.

Figure 2-5 Electrical transmission line connection to ASiMI substation

2.1.1.6 Generation Plant Water Supply System

CES proposes to use up to 6.19 cubic feet per second (cfs) (about 3,262 gallons per minute [gpm]) 24 hours per day, 7 days a week of water primarily as makeup to the circulating water system in the generation plant. Water use would vary depending on ambient air temperature, relative humidity and operation level of the generation facility. CES has estimated that, on average, temperature and relative humidity at its proposed facility would be approximately 39° Fahrenheit (F) and 62 percent respectively (Maxim 2001). Assuming a plant capacity factor of 85 percent, CES has predicted its water demand during this average condition would be 5.06 cfs. CES also estimated that during a “worst case” scenario in which the temperature and relative humidity are 90° F and 40 percent respectively, and assuming an 85 percent plant capacity factor.

2.1.1.6.1 Source of Industrial Water Supply

CES proposes to enter into an industrial customer water rights agreement with the City and County of Butte-Silver Bow to receive the required process water. Butte-Silver Bow would provide the water from an existing Silver Lake water right currently designated for industrial use (Butte-Silver Bow County 2001a). To meet the CES request for adequate water supply, Butte-Silver Bow has applied to the Montana DNRC for a change in its water right diversion rate in the amount of 6.19 cfs up to a maximum diversion volume of 3,900 acre-feet per year (Butte-Silver Bow County 2001a). The proposed diversion of 6.19 cfs would utilize storage in Silver Lake and instream flow from Warm Springs Creek. No water stored in Georgetown Lake would be used to accommodate the proposed action (Butte-Silver Bow County 2001b). Figure 2-6 depicts the water supply system that would transmit an adequate volume of process water to the proposed generation plant.

2.1.1.6.2 Industrial Water Supply Infrastructure

The industrial water supply for the proposed power plant would be provided from an existing 30-inch water line that parallels the west side of the main access road of the Technology Park. This main pipeline supplies water to the Technology Park from the Silver Lake Water System. CES proposes to construct a 16-inch water line to route water approximately 3,000 feet from the 30-inch mainline to the generation plant (Figure 2-1). The present TIFID Pump Station, located near Ramsay would be upgraded to have the capacity to deliver water to a 1,400,000-gallon service water reservoir on-site. A portion of the water in the tank would be dedicated to fire water supply. The remaining portion of the industrial water would be directed to the cooling tower as makeup. No other major modification of the existing water supply infrastructure is anticipated. A conceptual diagram of the generation plant water balance is shown in Figure 2-7.

2.1.1.6.3 Industrial Water Chemistry

Service water pumps would take suction from the service storage tank and direct service water through pressure filters. Filtered service water would be used for makeup to the evaporative coolers, feed to the cycle makeup system and other plant equipment uses. Potable water for sanitary uses would be chlorinated service water. To maintain a non-scaling condition in the circulating water system, the circulating water calcium concentration would be maintained below

900 milligrams per liter (mg/L) (as $CaCO_3$), the M-Alkalinity concentration maintained below 200 mg/L (as $CaCO_3$), and the silica concentration below 150 mg/L (as such). Water conditioning chemicals (chlorine and phosphorus) would be added to the circulating water as appropriate to control biological fouling, scaling, and corrosion. CES would also add sodium hypochlorite, sulfuric acid, and a commercial scale inhibitor.

The cycle makeup treatment system would consist of a reverse osmosis (RO) unit and a polishing, mixed bed demineralizer. The RO unit would provide primary treatment for water for use as makeup to the HRSG. The polishing, mixed bed demineralizer would complete the water purification process so the out flow of the unit would be suitable for HRSG makeup. The polishing, mixed bed, demineralizer would be regenerated off-site so that regeneration chemicals would not be required at the plant.

2.1.1.6.4 Domestic Water Supply

CES proposes to use groundwater to provide domestic water to the generation plant by constructing an on-site well. The location and depth of the well is not known at this time. CES proposes to comply with state of Montana well-completion and Public Water Supply requirements.

2.1.1.7 Process Wastewater Management

CES estimates that an average of approximately 250 gpm of process wastewater would be generated 24 hours per day at the proposed facility (a maximum of 300 gpm or 0.43 million gallons per day [gpd] is proposed). The difference in the raw water consumption rate (average 2,675 gpm) and the wastewater discharge rate (average 250 gpm) primarily represents loss due to evaporation and steam vaporization. CES also estimates that approximately 30 gpm of oil/water separator effluent would be generated.

CES proposes to treat and discharge process wastewater to effluent limits established in DEQ’s proposed MPDES Discharge Permit (Appendix D). Treatment methods include discharge to a land application and disposal unit during the period of May 1 through September 30 and use of a sedimentation holding pond before discharging to state waters (Appendix D). CES proposes to manage other wastewater (such as sewage and stormwater) generated at the facility in accordance with all DEQ requirements. Treatment methods and discharge conditions permitted by DEQ are described in this subsection.

Figure 2-6 Location map of water supply system for the Generation Plant

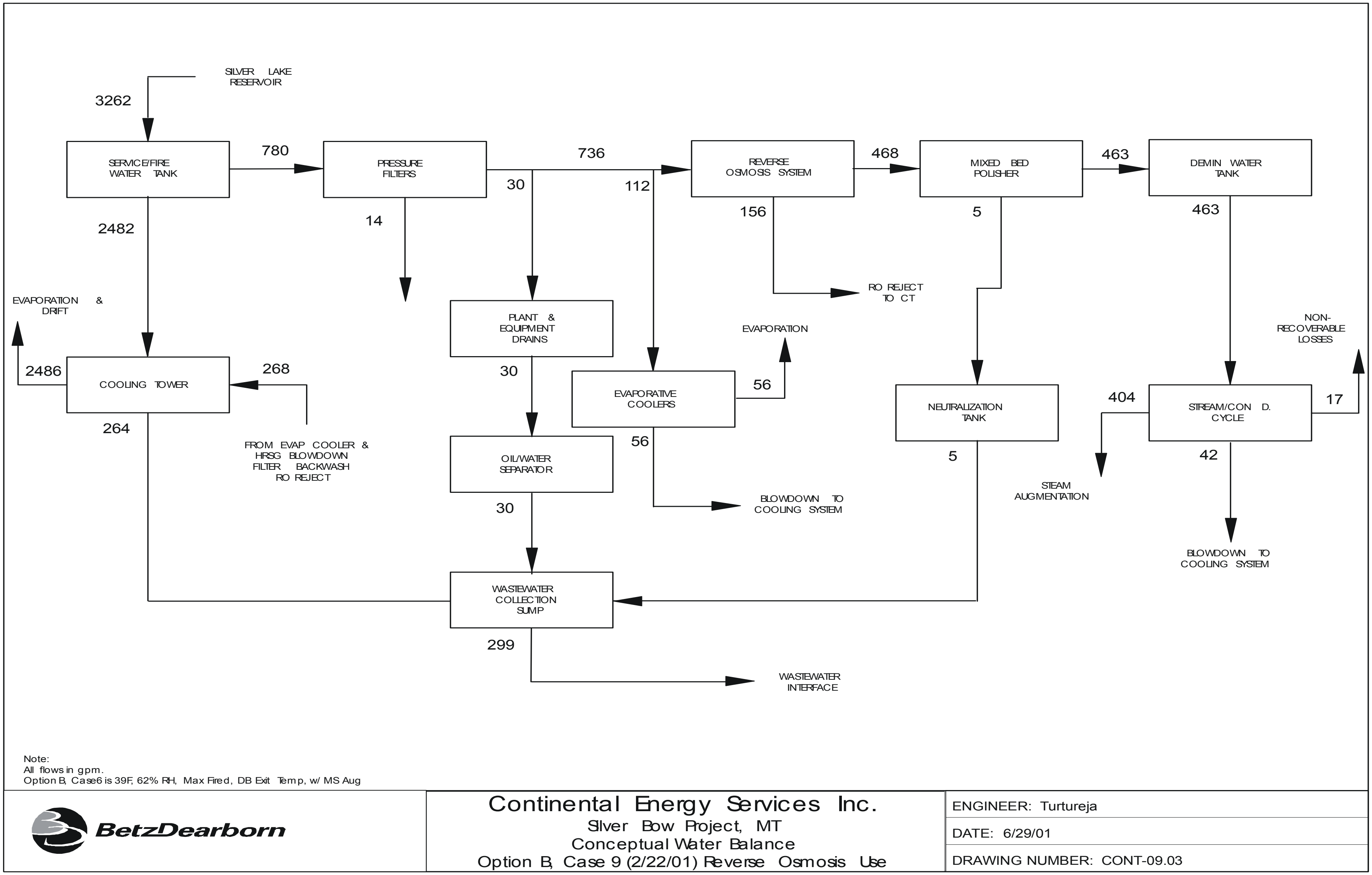


Figure 2-7 Conceptual diagram of the generation plant water balance

2.1.1.7.1 Land Application and Disposal Unit

CES proposes to use the land application and disposal unit (LAD) areas to treat and dispose of plant process wastewater for approximately 152 days each year. The plant process wastewater would be pumped from a small (0.5 million gallon) flow-regulating reservoir at the facility through a 6-inch diameter main pipeline to the LAD area. An underground pipeline system would distribute the process wastewater to one or more center-pivot irrigation systems located on nearly level fields near the generation plant. The center pivots would be fitted with drag socks on 30-inch spacings, which would allow the waste to be applied directly onto the ground. Application rates could be adjusted to control both the rate of water applied and the volume of water through each sock. The rate and volume of water applied during each event would be designed to be at a rate less than the infiltration rate of the surface soil (to eliminate surface runoff), but at a volume sufficient to meet the plant's need plus a calculated extra volume (called the leaching ratio) needed to move any soluble salts through the uppermost soil layer and root zone.

The center pivots would be located on the flattest available ground to avoid surface water runoff and utility lines. CES estimates a need for 100-200 acres at any one time to operate the LAD. The locations of the LAD areas has not yet been determined but CES has applied to the Montana Department of Natural Resources and Conservation for use by lease of school trust land (Figure 2-1).

2.1.1.7.2 MPDES Permit Conditions

The DEQ proposes to issue a Montana Pollutant Discharge Elimination System (MPDES) discharge permit (permit number MT-0030627) for wastewater discharges from the generation plant. The proposed discharge locations would be to either Silver Bow Creek or Sheep Gulch and the LAD. The timing of discharge to Silver Bow Creek or Sheep Gulch as defined in the permit would occur between October 1and April 30. Process wastewater discharges to the LAD would occur between May 1 and September 30 (DEQ, 2001). The maximum discharge to any one of the proposed outfalls would be limited to 300 gpm. The discharges would impact both surface water and groundwater resources near the generation plant. The permit incorporates technology and water quality-based limitations for surface water discharges and applies the state's nondegradation criteria for discharges to area groundwater.

The MPDES permit applies numeric effluent limitations at all three proposed outfalls consisting of both 30-day average and daily maximum concentrations. Parameters such as total suspended solids (TSS), oil and grease, free available and total residual chlorine, temperature, and numerous metals would be limited for discharges to Silver Bow Creek. For discharges to Sheep Gulch and the LAD, TSS, oil and grease, free available chlorine and only cadmium and zinc would be limited in the permit. Whole Effluent Toxicity (WET) testing would be incorporated for discharges to both Silver Bow Creek and Sheep Gulch (DEQ, 2001).

The permit incorporates a vast amount of monitoring at and near each proposed discharge location. Due to the lack of representative data, DEQ has included extensive monitoring requirements for each outfall. The monitoring would assess baseline conditions to aid in applying the nondegradation criteria in the shallow groundwater beneath Sheep Gulch and to ensure the protection of beneficial uses for Silver Bow Creek and Sheep Gulch by confirming permit compliance and to provide the basis for additional limitations, if necessary.

As the water classifications change (as anticipated for Silver Bow Creek after remediation), the standard provisions of the MPDES permit would allow DEQ to implement such changes and either revise the applicable limits or incorporate additional limits as necessary to ensure protection of State Waters. The MPDES permit would be issued for five years and could be revised prior to the permit renewal in accordance with the reopener provision of the permit. CES proposes to fully comply with all permit limitations and conditions.

2.1.1.7.3 Storm Water Management

CES proposes to direct storm water to a storm water retention pond designed to contain a 2-year, 24-hour storm event. The proposed pond location is shown in Figure 2-3. The storm drainage collection system would be designed to direct surface run-off to the pond. CES proposes to seek a storm water discharge permit for pond overflow and other storm water discharge from the generation plant site. The topography of the plant site is not conducive to flooding, therefore, no special flood control structures are anticipated.

2.1.1.7.4 Other Wastewater Management

Other wastewater generated at the proposed facility would be treated for oily waste and transported off-site, or discharged as sewage water to an on-site septic system. Wastewater treatment equipment would consist of an oil/water separator for treatment of potentially oily drains. Drains with the potential for contamination with oily wastes would be routed to an oil/water separator prior to discharge to the wastewater collection sump. The oily water separator would include storage for skimmed oil to be pumped out intermittently by the plant operators for disposal by an approved waste disposal contractor. All sanitary wastes would be routed to an on-site septic tank and disposed of via a lateral field.

2.1.1.8 Solid and Hazardous Waste Management

Solid and hazardous wastes expected to be generated at the proposed facility include sanitary waste, scrubber sludge, water treatment wastes, solvent cleaners, waste oils, oily refuse, SCR element, metal cleaning wastes, chemical wastes, and refuse materials. Sanitary waste would be discharged to an on-site septic system (Figure 2-3). A DEQ-approved waste disposal contractor would dispose of hazardous wastes, chemical spills, and container solid waste.

Solid Waste Management

Solid waste would be transported offsite. Nonhazardous solid wastes generated from routine maintenance activities and office operations would be recycled to the extent practical and the remainder removed on a regular basis by an approved waste disposal contractor. No facility landfill is planned.

Waste Heat

The generation plant combined cycle combustion turbine achieves higher thermal efficiencies than other conventional power plants by capturing the waste heat present in the combustion turbine exhaust gasses in HRSGs. Two, triple pressure HRSGs would be used, thus utilizing the best commercially available heat recovery system for this industry.

Hazardous Materials and Process Waste Management

CES proposes to minimize the type and quantities of hazardous materials required for plant operation. Where choices of materials present themselves, materials with reduced hazards would be selected. Hazardous bulk material storage and handling facilities would be designed with redundant containment to minimize the impact of spills. Spills would be neutralized manually and disposed of by an approved waste disposal contractor.

Used oil and small amounts of other hazardous wastes would be generated by plant operations. First priority would be given to recycling these wastes. Wastes that could not be recycled would be transported by an approved waste disposal contractor to a disposal site that is licensed to receive these wastes. CES proposes to generate less than 100 kilogram (kg) of hazardous waste, or less than 1 kg of acutely hazardous waste per month. This would place the CES generation facility in a hazardous waste generation category of “Conditionally Exempt Small Quantity Generator” under 40 CFR 260.10.

Pollution Prevention

CES proposes to avoid lubricant and fuel spills, pollution of any kind in all areas utilized by project activities, including streams and other bodies of water and their immediate drainage areas. Contractors would be required to report any spills of petroleum products in accordance with the applicable laws, ordinances and regulations of the appropriate local, state and federal agency. Any such spill would be immediately cleaned up. A Spill Prevention and Containment Control (SPCC) Plan would be implemented prior to construction for the Project. An Erosion Control Plan would be developed for storm water discharge pollution prevention during construction activities.

2.1.1.9 Transportation Systems

A new access road, approximately 3000 feet long, would be constructed from the existing ASiMI industrial service road to the Silver Bow Project site. In addition, asphalt-paved plant roads would be provided in and around the power block as required for access and maintenance. The plant primary access loop road would be paved 20 feet wide and would be composed of a 3-inch layer of asphalt over an 8-inch aggregate sub-base. No other transportation systems or terminals are expected be used during the construction, operation, maintenance or decommissioning of the proposed facility. The access road would extend westward to connect to the main road. This connection is accessed via exit 119 off I-15, which is German Gulch Road. Off of German Gulch Road the new Rick Jones Way connects to ASiMI and the new CES facility. The pipeline terminus would connect to the Technology Park road and have individual access for pipeline personnel. The metering station would be located within the pipeline ROW, and would be fenced and gated.

2.1.1.10 Communications

Off-site communication would take place primarily via telephone. There are no plans for a radio tower, microwave facility, or any other such communication device to be constructed for the plant. In addition to off-site communication using a telephone, Internet access and electronic mail would be available using computer network capabilities and protective relay coordination between the facility and the interconnecting electrical transmission system would be available using fiber optic technology. On-site communication capabilities would include an intercom system, cellular phones, and/or two-way radios. The pipeline terminus would have a leased fiber optic phone line and a cell phone. A Remote Telemetry Unit (RTU) would provide real-time data access to dispatch. A supervisory control and data acquisition (SCADA) system would be located at the terminus.

2.1.1.11 Generation Plant – Construction Plan and General Schedule

This section describes the construction plan, schedule of proposed activities and workforce need projections. Additional detail is presented in Appendix E.

2.1.1.11.1 Laydown Areas

The Technology Park would provide up to 30 acres of temporary additional space to CES for construction laydown (Figure 2-1). Bulk piping and cables would also require a separate laydown area that would facilitate removal of cable lengths and piping. A special needs storage area would be required for sensitive equipment as well as protection from the elements. Any structure damaged by CES or its agents by construction activities, such as terraces, levees, underground drainage systems, irrigation pipelines, canals, culverts and ditches, would be restored to pre-construction conditions and to the satisfaction of the owner.

2.1.1.11.2 Power Block, Electrical

At the power block, temporary construction electrical power would be provided by MPC or by the local electric cooperative. Back-up power would be provided by an internal dry cell battery system. The need to locate a temporary generating system on site, under normal circumstances, is not expected and none are planned at this time.

2.1.1.11.3 Construction Sequence and Schedule

CES proposes to take 23 months for construction and startup of the Silver Bow Generation Project from the start of site mobilization to commercial operation of the combined cycle plant. Construction is proposed to begin in the fall of 2002 and be operational by fall of 2004 (CES 2001d). Construction and activities are provided in detail in Appendix E. The overall sequence of construction and startup includes site preparation, constructing foundations, erecting major structures, installing major equipment, connecting major site interfaces, and startup/testing.

2.1.1.11.4 Work Force

CES estimates a workforce need of up to 700 workers during peak construction with an average requirement of 275 to 300 for most of the two-year construction period. Each segment of the

Power Block would have dedicated vendor crews for the turbines and major pieces of equipment that would require 8 to 15 workers per segment, for a total of 60, including foremen, equipment operators, general laborers, compliance monitors and construction inspectors. Each segment would require several vehicles, large cranes, and cherry pickers and various pieces of equipment, depending upon the activities performed. There may be more than one segment as previously discussed under construction at any one time in the power block and on site. CES project staff requirements are described in Appendix E (POWER 2001b).

CES proposes to provide temporary offices to support construction efforts on site. There are alternative service trailers and break rooms that would be occupied temporarily during the workday. These structures (trailers) would not be a permanent need of work forces. Construction workers would not be permitted to camp upon public lands while participating in construction activities, unless specifically requested to do so by the contractor and approved by CES. No construction camps would be developed.

2.1.1.11.5 Fire Control

The Butte-Silver Bow Fire District would provide fire control during construction and operation. Normal construction protocols would be adhered to pertaining to the relevant codes and standards of the NFPA.

2.1.1.11.6 Weed Control

CES has prepared a Noxious Weed Management Plan in cooperation with the Butte-Silver Bow Noxious Weed Control Board in anticipation of the construction phase of the proposed project (CES 2000).

2.1.1.12 Generation Plant - Operation and Maintenance

CES proposes to operate the generation plant 24 hours a day to provide its maximum electrical output throughout the year. To start the plant from a 0 percent-dispatched, operating mode, power would be backfed through three 161 kV powerlines to start the combustion turbine generators (CTGs). The turbines would be fired with natural gas. As proposed, once the generators are fired and brought to full speed, they would be synchronized with the existing transmission grid. The steam turbine generator would be loaded sequentially after the CTGs are loaded. Planned maintenance would be coordinated to reduce the impact of having a unit shutdown for maintenance and overhauls. Normally, this work would be planned during spring when the need for electricity is reduced.

Actual maintenance requirements for the generation plant would be influenced by the number of times the plant is started, the power setting, and the quality of fuel. For the equipment proposed for the generation plant, major combustion turbine maintenance activities and major overhauls would generally occur semiannually. Steam turbine major overhauls would occur about every six years.

2.1.2 Proposed Natural Gas Transmission Pipeline Upgrade

MPC proposes to supply the natural gas for the Project (Figure 1-1). This would require a significant expansion of MPC's natural gas transmission pipeline system. Approximately 97.5 miles of new natural gas pipeline would be added, along with expansion at two existing compressor stations and the addition of one new compressor station. Refer to Figure 2-8 for a map showing the location of the pipeline loops. Figures 2-9 and 2-10 show the configuration and photograph of a typical compressor station. The estimated construction costs for the pipeline and the compressor stations is approximately $65 million. The new pipeline would consist of three looped segments of 20-inch natural gas transmission pipeline for a total of 79.9 miles. An additional 17.6 miles of 16-inch pipeline would be constructed for the Morel Tap. Tables 2-1 and 2-2 provide design characteristics for each pipeline loop. The loops would parallel an existing 16-inch pipeline and are proposed for the Pendroy-Choteau, Augusta-Wolf Creek and Silver City areas. Pipeline construction schedule is provided in Appendix F. Pipeline loops are shown in detail in pipeline resource maps G-1 through G-13 (Appendix G).

2.1.2.1 Choteau Loop (Figures G-2 thru G-6)

The Choteau Loop would begin at MPC Valve No. 4 in the NE1/4 of Section 25 T. 27 N R. 5W. This pipeline segment runs parallel to the existing 16-inch Cut Bank to Morel line and would be built in the right-of-way of a decommissioned 20-inch MPC line. The decommissioned pipeline would be removed before installation of the new line. This pipeline segment crosses Highways 220, 221 and U.S. 89, and the Teton River about a mile and a half southeast of Choteau. Further south the line segment would cross Highway 408 and the Sun River just north of Highway 21. After crossing Highway 21 this 40-mile-long loop would end at the Mainline Compressor Station #3 in the SW1/4 of Section 8 T. 20 N R. 4W. The new 20-inch pipeline would be located within the existing corridor and adjacent to, but at least 30 feet away from, an existing 16-inch pipeline for a distance of 38.4 miles of the total distance of 39.8 miles. The 1.4 miles of reroutes (difference between the 38.4 miles of existing pipeline and 39.8 miles of proposed 20-inch pipeline) would be construction to avoid difficult terrain and cross drainages in a lower impact location.

An existing Mainline Compressor Station #3 is located at the terminus of the Choteau Loop and the beginning of the Wolf Creek Loop. At this compressor station, the equipment currently consists of two 1,100-horsepower reciprocating compressors and three 1,600 horsepower turbine units. Three new 1,600-horsepower compressor units would be added as part of the pipeline project in a new building adjacent to the existing station. The upgrade would bring the total to six 1,600-horsepower gas turbines and two 1,100-horsepower reciprocating compressor units at this site. This new unit would be built inside the existing fence using modern design methodology.

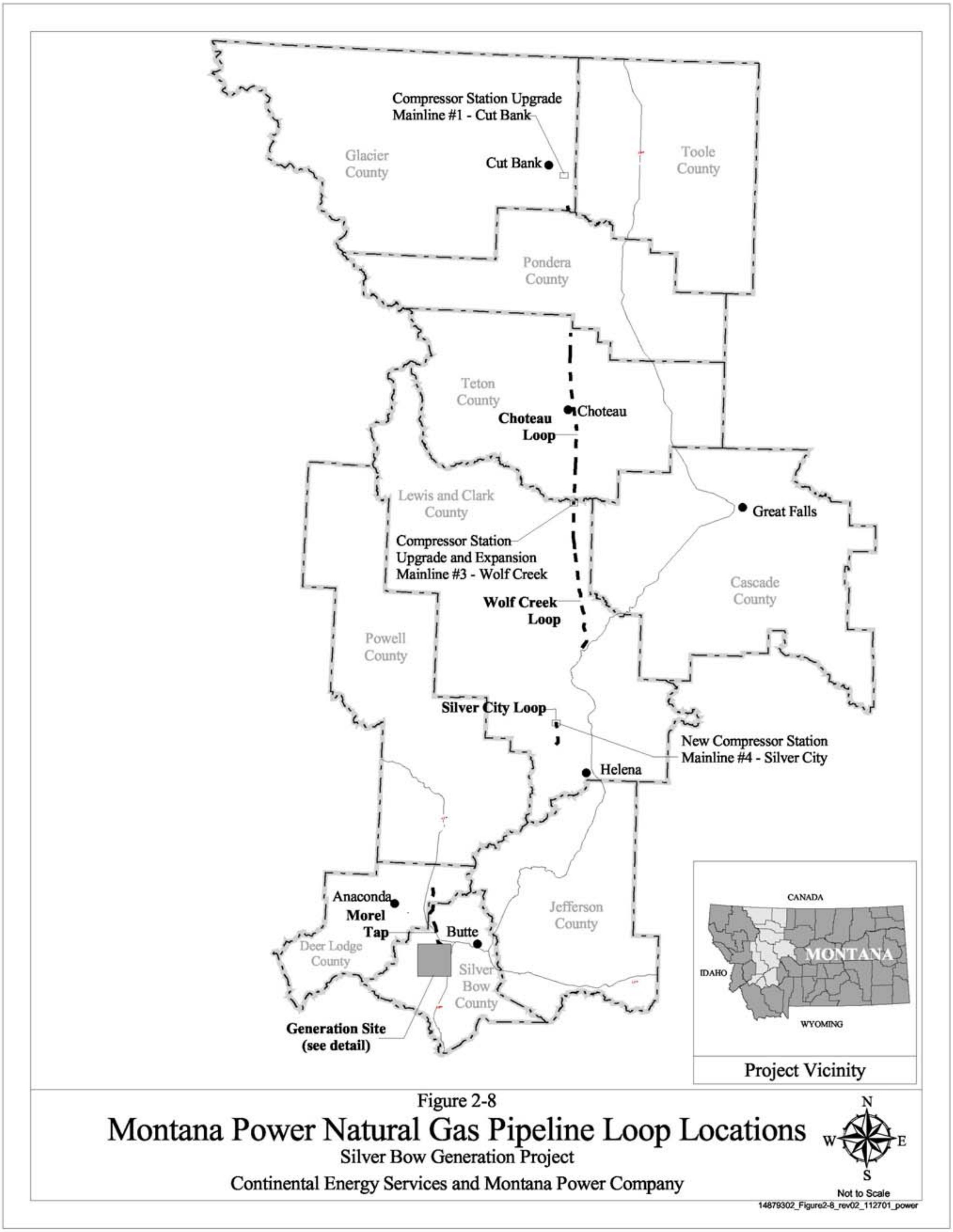


Figure 2-8 Pipeline loop locations

2.1.2.2 Wolf Creek Loop (Figures G-7 thru G-10)

This 34.9-mile-long loop runs south along the Cut Bank to Morel line and would cross Highway 200 and U.S. 287. The Dearborn River would be crossed in Section 27 T. 17 N. R. 4W parallel to the Cut Bank to Morel line. This segment ends at Valve #9 located in the SE ¼ of Section 34 T. 15 N R. 4W just off Wolf Creek Road. A new 20-inch pipeline would be located in the existing corridor and adjacent to the existing 16-inch pipeline for a distance of 26.1 miles of the total distance of 34.9 miles. To minimize the potential for damage to the existing pipeline, a 30-foot buffer zone will be maintained between the proposed pipeline and the existing pipeline (MPC, 2001d). The remaining 8.8 miles of reroutes would avoid difficult terrain and cross drainages in a lower impact location.

2.1.2.3 Silver City Loop (Figure G-11)

This 5.2-mile-long loop extends south from a new compressor station proposed at Main Line #4 to Valve #12 located in the NW ¼ of Section 25 T. 11 N R. 5 W where the loop terminates. The new 20" pipeline would be located within the existing corridor and adjacent to existing pipelines for the entire distance. To minimize the potential for damage to the existing pipeline, a 30-foot buffer zone would be maintained between the proposed pipeline and the existing pipeline (MPC, 2001d).

MPC proposes to construct a new compressing station, called the Mainline #4-Silver City Compressor Station, in the NE ¼ of Section 35 T. 12 N R. 5 W just west of Silver City. This new compressing station would consist of three 1,600-horsepower units, identical to Mainline #3. Because MPC has not completed negotiations for the property upon which Main Line #4 will be located, MPC is currently considering two adjacent sites. Both sites are located approximately 17 miles northwest of Helena, near Silver City, in Lewis and Clark County, Montana. Site #1 is in the SE¼ of the NE¼ of Section 35, T. 2 N, R. 5 W. Site #2 is in the SW¼ of the NW¼ of Section 36, T 12 N., R. 5 W. The site elevation of both sites is approximately 4,350 feet above sea level. Figure 2-9 presents a typical compressor station configuration.

2.1.2.4 Morel Tap (Figures G-12 and G-13)

This 17.6 mile long loop would require a new ROW for the entire loop from Warm Springs to the Generation Project site in the Technology Park. No other pipelines or linear facilities are located along this route. The loop would begin at the Morel Valve #16 in the NW ¼ of Section 17, T. 5 N., R. 9 W near Warm Springs. This loop would cross Interstate 90 near Ramsey and Silver Bow Creek and the Montana Rail Link railroad before terminating at the proposed Generation Project.

Table 2-1 Proposed Pipeline Loops

Loop Name	Start Point	End Point	Length (mi.)	Pipe Size and Grade
Choteau	S. 25 T.27N R. 5W	S. 8 T. 20N R.4W	39.8	20" APILx65x 0.250 wall
Wolf Creek	S. 8 T.20N R.4W	S. 34 T.15N R.4W	34.9	20" APILx65x 0.250 wall
Silver City	S. 35 T.12N R. 5W	S. 25 T 11N R.5W	5.2	20" APILx65x 0.250 wall
Morel Tap	S. 17 T. 5 N. R. 9W	S. 35 T. 3 N R. 9W	17.6	16" APILx52x0.250 wall

Table 2-2 Pipeline Characteristics

Loop	Outside Diameter (in.)	Tensile Strength (psi)	Test Pressure (psig)	Operating Pressure (psig)	Trench Depth (in.)	Ground Cover (in.)	New Right-of-way Required (miles)
Choteau	20	65,000	1625	1170	66	42	1.4
Wolf Creek	20	65,000	1625	1170	66	42	8.8
Silver City	20	65,000	1625	1170	66	42	5.2
Morel Tap	16"	52,000	1625	1170	66	42	17.6
TOTAL							27.8

2.1.2.5 Pipeline Construction Stages

Except for valve locations and compressor stations, the pipeline would be installed underground across land and under rivers, streams and roadways. The anticipated construction methods to be used for terrestrial construction of the pipeline are briefly described below, along with general information on construction. MPC proposes a permanent right-of-way width for the pipeline of 30 feet and a construction width of 100 feet.

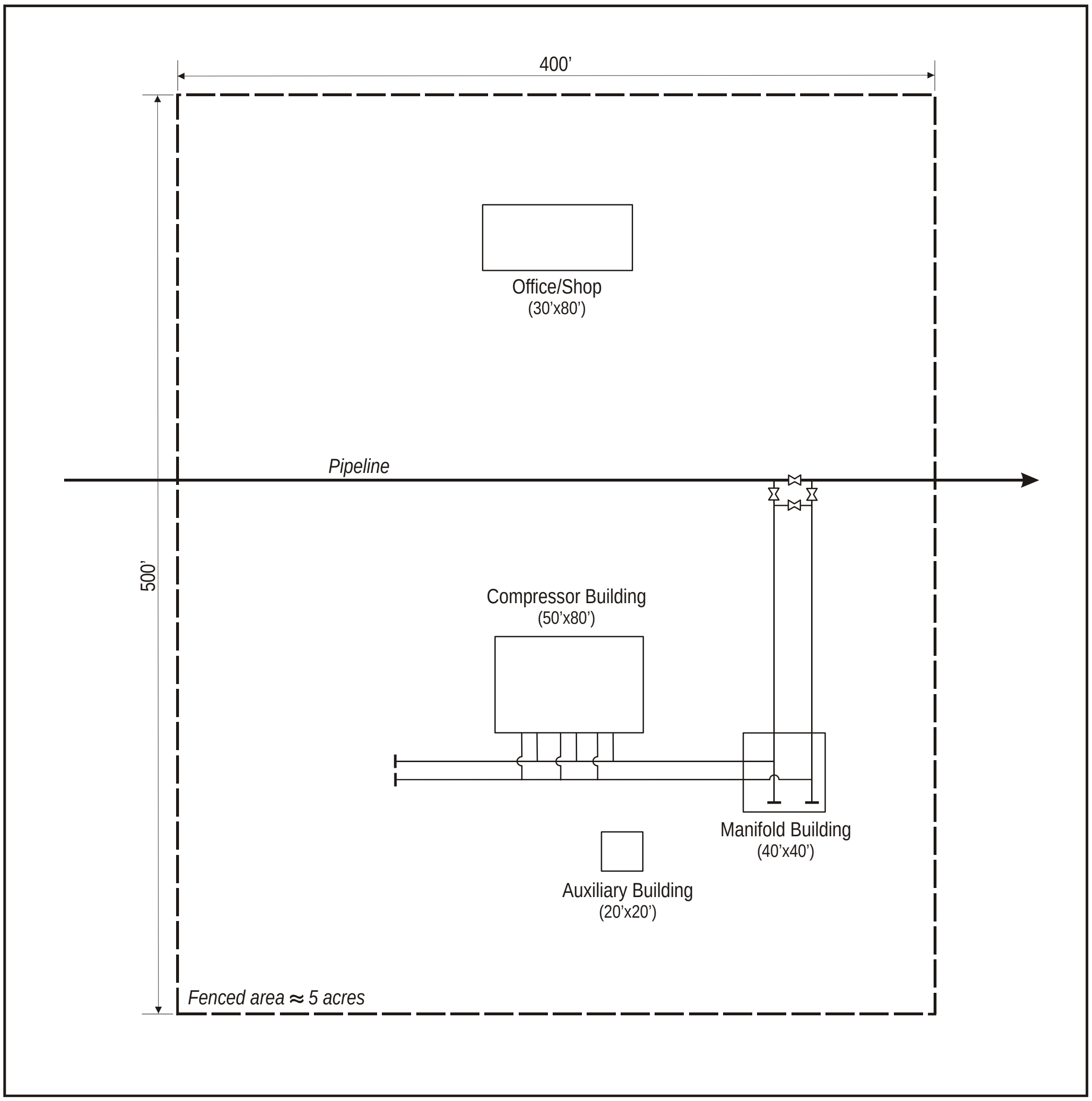


Figure 2-9 Typical general arrangement for compressor stations

Right-of-Way Construction

The width of the area required for pipeline construction would vary according to site-specific conditions. In general, MPC proposes the construction right-of-way as follows:

- The pipeline would be constructed from North to South
- There would be 100 feet of complete ground disturbance along the length of construction
- There would be 60 to 70 feet of space on the working side, defined as truck and personnel pathway
- There would be a 30 to 40 foot segment for the ditch and spoils
- The permanent easement would be 30 feet, 15 foot on each side of the centerline.

Ground disturbance predicted for each pipeline loop is shown in Table 2-3. Lengths of the three pipeline loops and Morel Tap may vary somewhat throughout the text of this document due to rounding differences and mapping interpretations by the resource team.

Table 2-3 Pipeline Ground Disturbance

Loop	Length	Construction ROW Width	Disturbed Acreage
Choteau	39.8	100 ft	482.4
Wolf Creek	34.9	100 ft	423.0
Silver City	5.2	100 ft	63.0
Morel Tap	17.6	100 ft	213.3

Construction and permanent easements for the pipeline would be negotiated with property owners. MPC anticipates making several payments to each affected property owner for the easement and expected inconvenience or the temporary loss of use that may occur during construction. These payments could include the cost of the option, the easement, and damages (if any). Landowners would also be compensated for crop damage and the other minor losses that may result from pipeline maintenance.

In general, the right-of-way easements obtained from public agencies and private landowners would give MPC the right to survey the route, clear and grade the right-of-way to accommodate construction, install the pipeline, clean up and return to grade, re-vegetate, and provide access for operation and maintenance. Temporary access to the right-of-way across existing access roads would also be negotiated. MPC's proposed construction schedule for the Pipeline Project is provided in Appendix F.

Pipe Staging Areas

Several locations along the proposed pipeline corridor would be selected as pipe staging areas, although not all of these areas may be used. These are places where the pipe sections can be unloaded from rail cars or tractor-trailers and temporarily stored while they await distribution (stringing) along the right-of-way. Currently, sites have been identified near Choteau, Helena, and

Figure 2-10 Photograph of Typical Compressor Station

Port of Butte. The staging areas would be 5 to 10 acres and would be located adjacent to existing roads or highways. The staging sites would be selected based on proximity to existing roads or rail sidings, the availability of land to stack pipe, and its central location to the construction spread. The pipe sections would be unloaded by crane and forklift and would be stacked on earthen berms. Traffic in and out of the site would be light, consisting of equipment operators, laborers, and an inspector arriving in the morning and leaving at the end of the workday.

When the pipe is ready to be strung out along the right-of-way, semi-trailer trucks would visit the site and haul away about 12-15 joints at a time. Traffic would be minimal with the stringing truck making 3-5 round trips per day. The pipe-stringing period may last up to 3 weeks per loop.

MPC does not proposed to have telephone or power installed at the site, and only temporary sanitary facilities would be used.

Contractor Construction Yard

As part of the preparations for construction, MPC proposes to secure a 10 to 20-acre yard area for use by construction crews. This area would be used to locate office trailers, storage trailers and fuel tanks, and as an assembly point for construction crews to meet prior to proceeding on the right-of-way. MPC's contractor would have office electricity and phone service and would arrange for temporary sanitation facilities for his personnel. Traffic volumes would vary from 40 to 50 vehicles arriving and leaving at the start of the workday to just a few vehicles per hour during the day. No workers would be assembled in the evenings. Occasionally, large trucks would arrive to deliver materials and supplies.

Land Pipeline Construction

Figure 2-11 illustrates a typical construction spread that would be employed for the proposed pipeline. Specific procedures for each pipeline segment would depend on the conditions identified during final engineering and design studies. No new access roads would be required for construction expected to be accomplished by one or two pipeline "spreads." Each spread is a coordinated crew that comprises the major construction crew and equipment necessary to complete entire sections of pipeline installation from start to finish. These spreads would follow the general construction procedures described below. It is anticipated that each spread would lay approximately 8,000 to 10,000 feet of pipe per day depending on terrain and weather.

Several construction units would make up each spread, with the work proceeding generally in the sequence listed below. Activities listed below are described in detail in Appendix F.

1. Surveying
2. Clearing
3. Trenching
4. Pipe Stringing
5. Bending Crew
6. Front End Welding Crew
7. Firing Line – Welding Crew

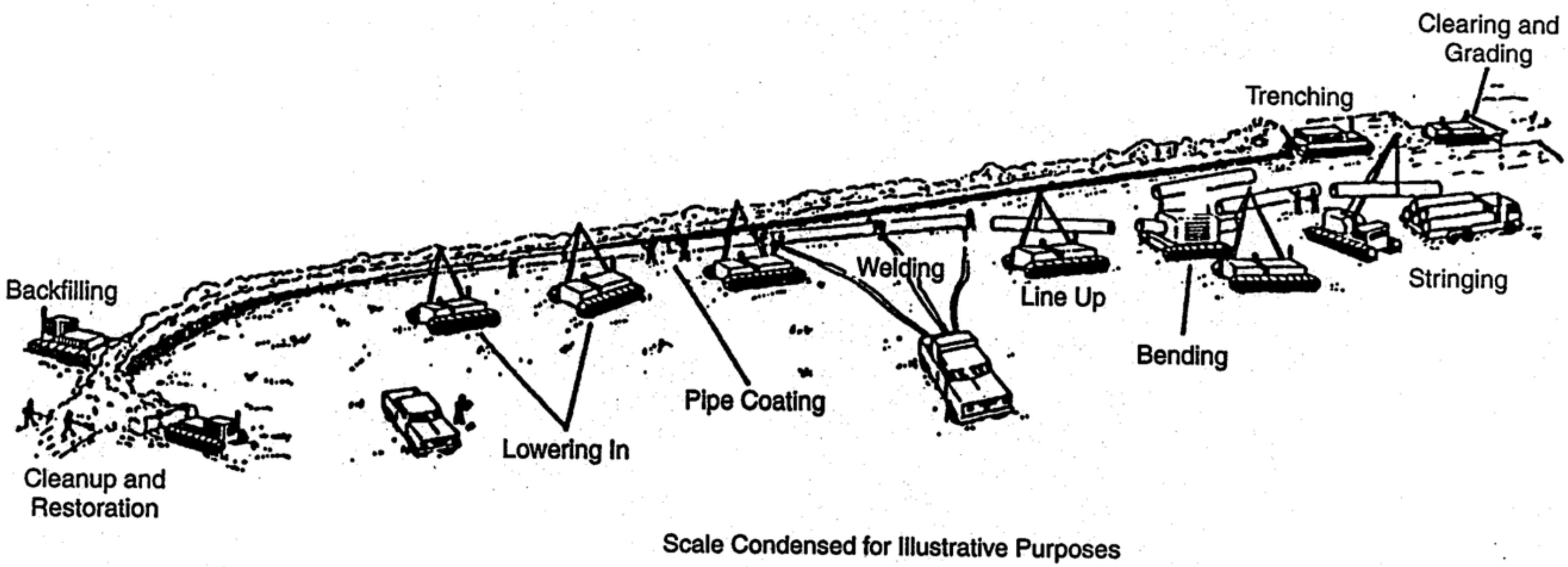


Figure 2-11 Typical construction spread

8. Radiography (X-ray)
9. Joint Coating
10. Pipe Laying

2.1.2.6 Backfill

Backfill would normally be placed over the pipe string within a day of the pipe being lowered into the trench. Two or three bulldozers would normally be used to push stockpiled materials removed from the ditch back into the ditch to cover the pipe. In areas that contain large quantities of rock, select fill material may be imported to place the first six inches of cover over the pipe, or special padding machines may be brought in to screen the rock from the backfill before it is placed in the ditch. Extreme care would be taken with the initial fill to avoid damage to the coating during backfill. After the initial six inches of screened material is placed on the pipe, the remaining soil and rock mixture would be returned to the open ditch to complete the backfill. MPC proposes to comply with the amount of backfill (cover) required between the top of the pipe and the ground level as presented in Table 2-4.

Table 2-4 Cover Standards for Buried Pipelines

Location	Cover (DOT Standards)[2]		Cover (MPC Standards)	
	Normal Excavation (inches)	Rock Excavation (inches)	Normal Excavation (inches)	Rock Excavation (inches)
Class I - Industrial, commercial and residential areas	30	18	42	30
Class II - Crossings of bodies of water with a width of at least 100 feet from high water mark to high water mark[1]	36	24	42	24
Class III and IV – Navigable River, Stream, Harbor	48	24	60	24
Drainage ditches at public roads and railroads	36	24	48	48

1 DNRC standards call for cover depth to two times the depth of scour in a 100-year floodway.
2 These are minimum depths required by U.S. Department of Transportation (DOT) regulations. MPC would comply with DNRC and DOT requirements and would strive for a minimum of 42 inches of cover at all locations where feasible (49 CFR 192.327).

In order to tie pipe strings together, the backfilling would leave a significant portion of the end of the pipe exposed. The second string would be lowered into the trench so it barely overlaps the backfilled pipe. The ends of the pipe would be lifted, externally clamped in position, and then welded together. While still exposed, the string joints would be X-rayed and then coated prior to lowering and completing the backfilling.

2.1.2.7 Hydrostatic Testing

The entire pipeline would be hydrostatically tested in accordance with DOT regulations. Pipe that is prepared for stream crossings would be air or hydrostatically tested prior to installation. If leaks are detected, they would be repaired or the pipeline section replaced and the section retested.

Water for testing would be purchased from water rights holders and transported to the test sections. When hydrostatic testing is complete, the test water would be land applied on selected upland areas approved by the landowners. All work would be done in compliance with the permits obtained for the project. Final discharge plans would be developed in consultation with the DNRC water rights program.

The water requirements for each section of pipe are detailed in Table 2-5.

Table 2-5 Water Requirements for Hydrostatic Testing

	Pipe Diameter	Pre-Survey Mileage	Water Cubic Feet	Water Gallons	Estimated Test Sections
Choteau	20”	39.8	453,839	3,260,073	4
Wolf Creek	20”	34.9	382,180	2,858,707	8
Silver City	20”	5.2	62,419	466,895	1
Morel Tap	16”	17.6	121,736	910,583	2
Total		**97.5**	**1,020,174**	**7,496,258**	**15**

This is the amount of water required to fully fill each and every test section without reusing any water. This is a conservative way to approach the permitting given the uncertainty of the project construction timing. For example, if the Choteau loop were built in the fall of 2002 and the rest of the construction delayed till 2003, no water transfer capability would be possible.

The proposed hydro-test pressure is estimated to be 100% of specified minimum yield strength at the low point of each test section. This pressure is estimated to be 1625 psig for nearly the entire pipeline. The water sources could be the following:

Choteau	Teton River and/or Sun River
Wolf Creek	Sun River and/or Dearborn River
Silver City	From a Municipal Source
Morel Tap	TIFID Silver Lake Pipeline

2.1.2.8 Restoration

After backfill is complete and all miscellaneous sections within a given length of pipeline have been tied together, the restoration operation would begin. Material that was pushed aside to make the temporary level working area would be placed back on the right-of-way. The original contours of the land would be restored as closely as possible. As part of the restoration process, all equipment access crossings would be removed. The banks of watercourses would be stabilized and restored. Restoration would include re-vegetation with native species.

After the contours have been re-established, topsoil that had been previously segregated would be redistributed across the surface of the right-of-way, and water bars would be graded across the slopes. This procedure helps to prevent the formation of rills and gullies due to heavy rains by periodically diverting runoff to the sides of the right-of-way and away from the ditch line. It also protects the slopes during the first few years until the soil stabilizes and vegetation establishes.

2.1.2.9 As-Built Survey

The actual pipeline centerline would be GPS surveyed concurrently with the pipeline lay operation. Pipeline markers would be installed along the route to show the location of the pipeline, identify the owner of the pipeline, and provide a local or toll-free ("1-800") telephone number to contact the owner regarding activities that may affect the pipeline.

2.1.2.10 ROW Crossings of Transportation Routes

Road Crossings

At locations where the pipeline must cross a roadway, the crossing would be accomplished by either the open-cut or boring method. Figure 2-12 illustrates a typical road crossing. Boring would be the least disruptive method, but this technique cannot be used effectively in areas where boulders or rock are present or for crossings longer than approximately 200 feet. Where boring is not possible, the open-cut method would generally be used.

Boring would require digging a pit on one side of the road. A machine would be lowered into the pit to begin boring with pipe inserted into the hole as it is being drilled. The outside of the pipe would be coated with concrete or abrasion resistant material to protect the pipe coating from scarring and nicking as it is pushed through the bore hole. As each complete joint of pipe is installed, the boring shaft would be separated and another joint of pipe welded to the first joint. The shaft would then be reconnected through the new section of pipe and the boring would continue. This method continues until the boring head and the pipe is received in a "capture" pit on the opposite side of the crossing. Since the pipe being installed would be the actual pipeline carrier pipe, all welds would be X-rayed as they are completed. Casing would not be installed, because casing increases the potential for future corrosion problems or failure of the pipe.

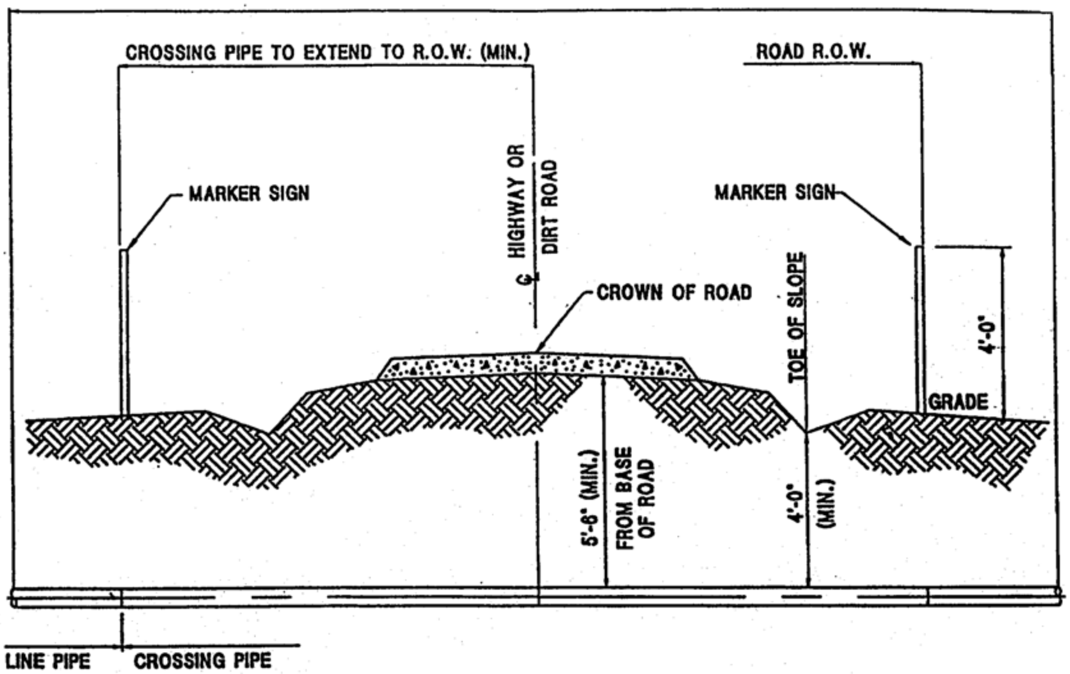
When the open-cut method is used, traffic would be diverted around the crossing via detours or temporary roads. To minimize the duration of traffic disruption, the pipe would be prepared prior to commencement of roadway excavation. Once the pipeline has been installed, the trench would be backfilled and compacted in lifts in accordance with relevant agency specifications. The roadway would then be resurfaced over the compacted trench.

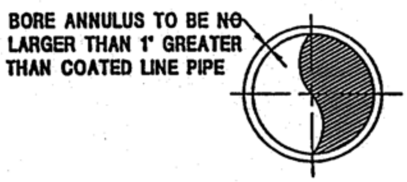
Railroad Crossings

Railroad crossings would be installed by the bored-crossing method only (see Figure 2-13) since open-cut construction is not feasible with railroads. The pipe would be installed in accordance with the latest requirements of the American Railroad Engineering Association. Since the minimum depth requirements for uncased crossings are six feet of cover in the ditches and a minimum 10 feet of cover below the rails, additional working space would generally be required to (1) allow the pipeline to reach the greater depth, and (2) provide an area to deposit the materials removed from the larger boring pit. The boring method used would be identical to that described above for roadways. Upon completion of boring, the pits would be backfilled, with the exception of the exposed ends of the pipe. These ends would be left exposed until the mainline spread reaches the railroad crossing and connects them to the rest of the pipeline.

2.1.2.11 ROW Crossings of Water Bodies

MPC proposes to cross 79 streams and drainages during construction of pipeline loops and the Morel Tap. Figures G-1 through G-13 in Appendix G show the locations and names of all water crossings. Crossings may be installed concurrently with the mainline construction spread. Separate crews would install bored crossings of interstate highways and primary and secondary roads. These crews would perform the excavation, boring or ditching, welding and installation of the crossing pipe. All pipe joints located at crossings of public thoroughfares would be X-rayed 100 percent before the pipe is installed. Separate crews would also install water crossings. Depending on the schedule requirements, the same crew that installs the road crossings could install the water crossings. All welds in a water crossing would be X-rayed 100 percent.

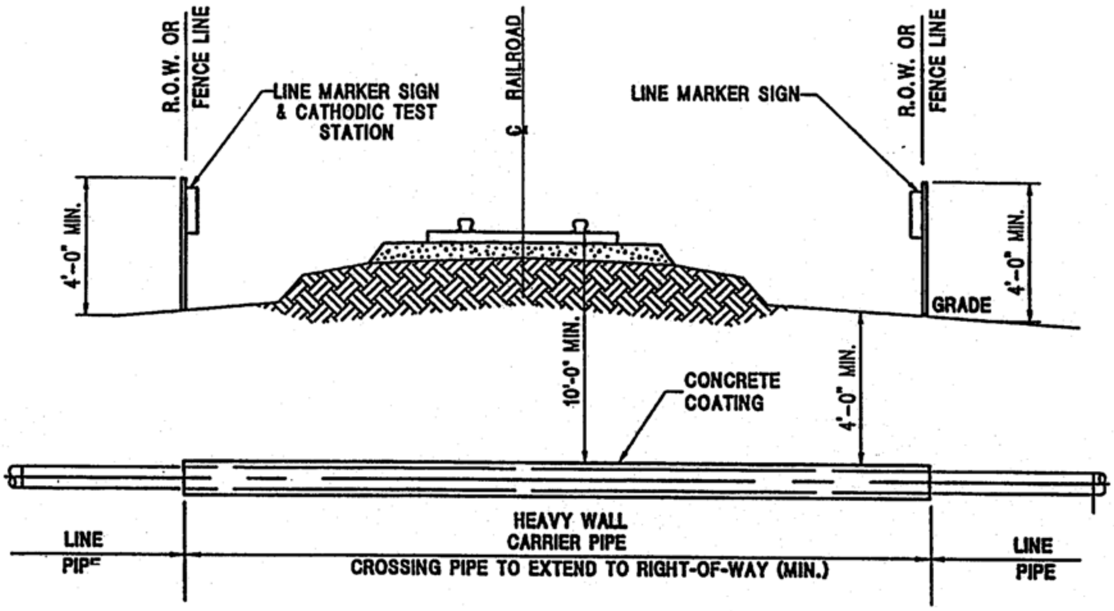




NOTE:
1. All bored crossing pipe shall have a minimum of 1" concrete coating for protection during insertion. Pipe for open cut crossing does not require concrete coating.

Source: Olympic Pipe Line Co.

Figure 2-12 Cross section of Road Crossing



NOTES:
1. Carrier pipe to be factory coated.
2. All bored crossing pipe shall have a minimum of 1" concrete coating for protection during insertion.

Source: Olympic Pipe Line Co.

Figure 2-13 Typical bored and casing railroad crossing

MPC proposes to construct the pipeline using the trench method at all stream crossings except Silver Bow Creek and Teton River. Silver Bow Creek is listed as a Superfund Site and would be crossed using directional drilling to avoid disruption of hazardous materials in the sediments of the floodplain and streambed. The two rail lines in this area would also be bored at the same time.

Directional drilling at the Silver Bow Creek crossing would eliminate disturbing mine tailings present at the Silver Bow Creek crossing, which has been identified as hazardous waste (Maxim, 1996). Disturbance of the tailings would require special handling and, potentially, off-site disposal and replacement with imported granular fill. The decommissioned 20” pipeline that is exposed at its crossing of the Sun River would be removed.

The pipeline would also cross several wetlands. MPC proposes to comply with wetland mitigation measures required by the Army Corps of Engineers (Appendix H) and all permit conditions (Appendix A). Stream crossing timing windows are shown in Table 2-6. The following sections describe methods used during clearing and grading, accessing, trenching and drilling, installation, cleanup and staging for streams/rivers and wetlands.

Table 2-6 Pipeline Stream Crossing Timing Windows

Stream Name	Pipeline Loop	Township, Range, Section	Game fish species present within 5 miles of pipeline crossing (approximately)[a]	Construction Timing
Jones Creek	Choteau	T26N R5W sec 24	LL	July 1 – April 1 construction window
Muddy Creek	Choteau	T26N R5W sec 25	RB, LL, BN	October 1 – March 1 construction window
Foster Creek	Choteau	T26N R5W sec 25	EB	July 1 – March 1 construction window
Spring Creek	Choteau	T24N R4W sec 32	RB, EB	July 1 – Sept 15 construction window
Backwater of Teton River	Choteau	T24N R4W sec 32	RB, LL, EB, MWF – Important trout spawning stream	July 1 – Sept 30 construction window
North Elbow Coulee, crossings #1 and #2	Choteau	T22N R4W sec 20	Unknown	July 1 – Sept 15 construction window
Big Coulee	Choteau	T21N R4W sec 5	EB	July 1 – Sept 15 construction window
Elbow Coulee	Choteau	T21N R4W sec 20	EB	July 1 – Sept 15 construction window
South Elbow Coulee	Choteau	T21N R4W sec 32	Unknown	July 1 – Sept 15 construction window
School Section Coulee	Choteau	T20N R4W sec 5	EB	July 1 – Sept 15 construction window
Sun River – high water channel #1	Choteau	T20N R4W sec 5	LL, RB, MWF	July 1 – Sept 30
Sun River – high water channel #2	Choteau	T20N R4W sec 5	LL, RB, MWF	July 1 – Sept 30
Sun River	Choteau	T20N R4W sec 5	LL, RB, MWF	July 1 – Sept 30

Stream Name	Pipeline Loop	Township, Range, Section	Game fish species present within 5 miles of pipeline crossing (approximately)[a]	Construction Timing
Back water of Sun River	Choteau	T20N R4W sec 5	LL, RB, MWF	July 1 – Sept 30
Flat Creek	Wolf Creek	T18N R4W sec 21	LL, possibly RB and EB	July 1 – April 1 construction window. Good brown trout fishery
Dearborn River	Wolf Creek	T17N R4W sec 27	RB, LL, EB, MWF. Critical spawning stream for Missouri River trout.	July 1 – Sept 30
Silver Creek	Silver City	T11N R5W sec 1	CT. Other species further downstream include: EB, LL, KOK, RB, KOK	Cross in spring before April 1.

[a] Game fishes: LL = brown trout, RB = rainbow trout, CT = cutthroat trout, and MWF = mountain whitefish

2.1.2.11.1 Clearing and Grading for Stream and Wetland Crossings

Stream Crossings

An undisturbed vegetation buffer would be maintained until actual stream crossing construction begins, except where a crossing for vehicles and construction equipment is placed. The vegetation buffers will extend from the high water mark of the streams to a distance of 50 feet in each direction. In the event that soil within the vegetation buffers is disturbed prior to construction, sediment barriers would be installed across the pipeline right-of-way.

Wetlands

An undisturbed vegetation buffer would be maintained until actual wetland crossing construction begins, except where a crossing for vehicles and construction equipment is placed. The contractor would not begin crossing construction without approval from the authorized MPC representative. The vegetation buffers would extend from the edge of the wetland to a distance of 20 feet in each direction. In the event that soil within the vegetation buffers is disturbed, sediment barriers will be installed across the pipeline right-of-way.

2.1.2.11.2 Access for Stream and Wetland Crossings

Streams

Culverts or temporary work bridges may, at the MPC's discretion, be installed across the streams to provide access to the work areas on both sides of the streams. This will minimize stream bank degradation, erosion, and sediment flow into the waterway. Culverts would be stabilized using existing material. Sand-filled bags may be used to channel the upstream flow through the culvert and stabilize the trailing edges of the culvert.

Wetlands

All construction vehicles and equipment traffic would travel around wetland areas where possible provided that MPC has obtained permission from the landowner to do so. Every effort would be made to minimize the amount of vehicle and equipment crossing identified wetland areas.

2.1.2.11.3 Staging Areas for Stream and Wetland Crossings

The staging areas for stream and wetland crossings would be located at least 50 feet away from the stream bank or edge of the designated wetland area. The size of the staging area would be limited to the minimum amount needed to construct the crossings. Hazardous materials, chemicals, fuels, and lubricating oils would not be stored within 300 feet of stream banks, wetlands, or within any municipal watershed areas. All refueling of equipment or vehicles would take place no closer than 100 feet from a stream bank or wetland. Concrete coating activities would take place no closer than 100 feet from a stream bank or wetland. All onsite vehicles and equipment would be monitored for leaks and receive regular preventative maintenance to reduce the chance of petroleum leaks.

2.1.2.11.4 Stream and Wetland Trenching Methods

No trenching would take place in streams until actual crossing construction begins. Trenching will be accomplished using track-mounted excavators, which will only enter the stream as necessary to complete the work. Trench topsoil would be removed from the streambed for segregated stockpiling in adjacent upland areas behind a silt fence. Where possible, trench spoil would be placed at least ten feet away from stream banks at all stream crossings. In instances where this cannot be accomplished, the spoil pile would be located in the stream in such a manner as to prevent undue flow restrictions. The flow of spoil off the construction right-of-way would be prevented.

The pipe would be strung, welded, and x-rayed on the adjacent upland right-of-way at a distance from the stream bank or edge of the wetland. In the event that MPC requires the use of concrete coating for negative buoyancy, the concrete coating activities would not be performed closer than 100 feet from the stream bank or edge of the wetland.

Backfilling of the pipeline would be accomplished in such a manner as to prevent the disturbance of additional, previously undisturbed, soil in the streambeds or wetland areas. No work would begin in designated wetlands until actual crossing construction by trenching begins. Wetland topsoil containing wetland plant parts and seeds would be salvaged to an approximate depth of at least 12 inches and stockpiled adjacent to the trench. Excavated subsoil would be stockpiled separately from the salvaged topsoil. The flow of spoil off the construction right-of-way would be prevented.

Additional Proposed Trenching Methods

1. Trees removed for construction will not be skidded or yarded across a stream.
2. Backfilling of trenches within streams will be done with original streambed material unless this material is known to contain contaminates. If contaminated, new fill material of similar grain size and distribution shall be imported and used as backfill.
3. The burial depth of the pipeline across designated floodways is in compliance with the protective provisions of Rule 36.15.602(4)(c) of the Administrative Rules of Montana. All pipeline crossings will be constructed as perpendicular as possible to the axis of the stream or river to minimize the amount of construction-related disturbance of surface water features along the proposed pipeline route.
4. MPC's general description, construction, and mitigation procedures for stream and wetland crossings (discussed above) will be followed during construction of the pipeline across wetlands.
5. All construction and maintenance activities would be conducted in a manner that will minimize disturbance to vegetation, drainage channels, and streambanks.
6. Streambank revegetation will occur at all stream crossings where pipeline construction has caused significant loss of bank vegetation. Revegetation will normally be done with native plant species, and where appropriate, woody species.

Directional Boring Methods

A small diameter pilot hole would be drilled along the designed path at an angle from 8-18 degrees from the horizontal. A bentonite drilling mud system would then pump mud through the drill pipe to power the drill bit and remove bit cuttings from the hole. The drilling mud would be hauled away by truck and disposed of at an approved location. The drill path would be designed for the depth and length of the crossing and the diameter of the pipe to be installed. The drill path would be monitored electronically and the drilling system adjusted to steer the drill bit along the required path.

After the pilot hole is completed, the hole would be enlarged to the required diameter by reaming. As with the pilot hole, the mud system would be maintained to remove material cut during the reaming. The final diameter of the hole would be larger than the diameter of the pipeline that is to be installed through the bore. The pipeline would then be pulled through the borehole, hydrostatically tested, and welded into the adjoining sections of the pipeline.

The size of the equipment used for directional drilling is similar to normal tracked equipment used during pipeline construction. The proposed entry workspace would be approximately 300 feet from the bank of Silver Bow Creek. The proposed exit workspace would be about 300 feet from the opposite bank. No bank disturbance would be expected. Water lines would be temporarily laid on the surface during drilling and hydrostatic testing.

Directional drilling should take two weeks per crossing to complete. Site preparation would take approximately three days.

2.1.2.11.5 Water Crossing Cleanup and Reclamation

Streams

Construction equipment and debris would be removed from the streambed and stream banks. Streambeds and stream banks would be restored to as near pre-construction contours as possible and re-seeded. The re-seeding would be accomplished using MPC crews. Sediment filter devices at the base of all slopes located adjacent to streams would be maintained until right-of-way re-vegetation is completed. The Contractor would be responsible for maintaining all sediment filter devices until the completion of the project. MPC crews would take over the maintenance of the sediment filter devices from that time forward until re-vegetation is complete. Ground matting (excelsior blankets) may be installed on slopes of stream banks to accelerate vegetation stabilization.

Wetlands

Upon completion of the backfilling of the trench using the previously excavated subsoils, the salvaged topsoil would then be placed on the trench and disturbed areas within the construction zone.

2.1.2.12 Additional Restoration Methods

1. In construction areas where recontouring is not required, vegetation would be left in place wherever possible and original contour would be maintained to avoid excessive root damage and allow for resprouting.
2. In construction areas (e.g., compressor station sites, marshaling yards, spur roads from existing access roads) where ground disturbance is substantial or where recontouring is required, surface restoration would occur as required by the landowner or land management agency. The method of restoration normally consists of returning disturbed areas back to their natural contour, reseeding with native seed mix (if required), installing cross drains for erosion control on slopes exceeding 10%, and placing water bars in the road and filling ditches.
3. Salvage of topsoil during pipeline construction, as well as the prompt reseeding with appropriate seed mixtures would assure that affected areas along the proposed route are restored to their pre-disturbance condition.
4. Cut and/or blasted slopes would be rounded at the top to blend the cut and provide transition. Boulders that have been displaced and stored to one side of the right-of-way would be redistributed over the area in a random manner. No right-of-ways or boundaries of newly placed boulders would remain. Rocks would be reset to their original soil line.
5. Prior to reseeding, all areas of disturbance and vehicle travel or heavy equipment use would be deep ripped or disked to loosen the topsoil surface. Ripping would be done when soils are wet to promote clodding prior to seed and mulch application.

6. Straw mulch or other mulch may be used to protect seeds from erosion and movement, and to promote vegetation establishment.
7. Final soil stabilization and revegetation would be accomplished as soon as practical following construction. Stabilization methods and revegetation success will be monitored for the first growing season.
8. All stream and wetland crossings, once the soil is disturbed in the vegetation buffers, would be completed in three days or less.

2.1.2.13 Additional Mitigation Measures

The goal on the pipeline project is to minimize effects to the environment during construction. In addition to the measures discussed above, the following measures or techniques would be employed as necessary and appropriate to avoid or minimize impacts as part of the pipeline project design.

2.1.2.14 Generic Mitigation Measures

Construction and Maintenance Access

1. All construction vehicle movement outside the pipeline construction easement, transmission line right-of-way, and compressor station properties will normally be restricted to predesignated access, contractor-acquired access, or public roads. Construction activities will be restricted to and confined within the predefined limits.
2. Roads will be built at right angles to the streams and drainages to the extent practicable.
3. Culverts or rock crossings will be installed where needed.
4. Vehicle travel will not be normally permitted on the pipeline right-of-way, except as needed by MPC for repairs or maintenance of the pipeline or for local landowner access by agreement with MPC.
5. Existing roads will be utilized for substation upgrade construction.
6. No paint or permanent discoloring agents will be applied to rocks or vegetation to indicate limits of survey or construction activity.

Gates, Fences, and Existing Roads

1. Existing land improvements (e.g., fences, gates, roads, watering facilities, etc.) will be repaired or replaced if they are damaged or destroyed by construction activities to their condition prior to disturbance as agreed to by the parties involved. Temporary gates will be installed only with the permission of the landowner or the land management agency and will be restored to original condition prior to project disturbance following construction. Improvement may be left in place at landowner's discretion.
2. All existing roads will be left in a condition equal to their condition prior to the construction of the project facilities.

Construction Crews

Prior to construction, all supervisory construction personnel will be instructed on the protection of cultural, paleontological and ecological resources.

Cultural Resources

1. Potential impacts to cultural resources have been addressed through consultation with the Montana State Historic preservation office (SHPO). If required, specific measures would be developed and implemented to address any potential impacts. These would include project modifications, avoidance, or restricted construction area to avoid adverse impacts and data recovery studies aimed at the mitigation of unavoidable impacts.
2. In the event of the discovery of cultural or paleontological properties in the course of any Project facilities construction, all land-disturbing activities within a restricted operating zone (ROZ) of a 500 feet radius of the point of initial discovery would be halted. Work outside the ROZ area would be continued as planned. MPC or their designated representative would contact the appropriate state or federal agencies, and implement the provisions of those statutory or regulatory authorities applicable to the location and nature of the discovered resources. In all discovery situations, the objective would be to identify and implement those measures that would provide for the avoidance or mitigation of impacts that could result from construction of Project Facilities, before construction resumed in the ROZ. Specific measures to address potential impacts in these discovery cases are specified in Chapter 4.

Air Quality

1. Road construction will include dust-control measures (i.e., watering) during construction in sensitive areas, as required.
2. All requirements of those entities having jurisdiction over air quality matters will be adhered to and any permits needed for construction activities will be obtained. Open burning of construction trash will not be allowed unless permitted by appropriate authorities.
3. The agency’s Proposed Action includes the granting of Preliminary Determinations for air quality permits for compressor stations (Appendix I).

Waste and Cleanup

1. Hazardous materials will not be drained onto the ground or into streams or drainage areas. Totally enclosed containment will be provided for all trash. All construction waste including trash and litter, garbage, other solid waste, petroleum products and other potentially hazardous materials will be removed to a disposal facility authorized to accept such materials.
2. Any areas of soil subjected to possible contamination from accidental spills of petroleum or other chemicals will be promptly cleaned up and disposed of in an appropriate manner.

3. To prevent contamination of wetlands and other surface waters from potential leaks or spills from equipment during construction, no equipment would be refueled or greased within 100 feet of a wetland or perennial stream. In addition, fuels, oils, lubricants, herbicides, or other potentially hazardous materials would not be stored within 300 feet of a wetland or perennial stream.
4. A spill prevention plan will be developed that addresses containment and cleanup of spills affecting surface waters.

Wildlife

1. Intentional harassment of wildlife would not be permitted at any time during project construction activities.

Weed Control

1. Prior to construction and based on consultation with the county weed control boards, noxious weed populations would be inventoried along the proposed pipeline route. A plan to control the spread of noxious weeds during construction would be developed, reviewed, and approved by the county weed boards. Weed control following construction will be done according to the weed control plan.
2. All reseeding mixtures used for reclamation will be certified weed-free.
3. The short-term duration of the proposed pipeline construction project, high pressure washing of construction equipment and vehicles prior to entry to the project site, rapid initiation of proposed reclamation and weed control procedures based on the proposed pre-construction noxious weed inventory of the pipeline route, and implementation of effective erosion control and soil loss prevention procedures are anticipated to result in successful revegetation.

Agricultural Operations

1. To prevent problems with livestock, all fences and gates would remain closed at all times throughout construction unless specified otherwise by the agency manager or landowner.
2. MPC and the construction contractors will coordinate activities with farmers to ensure (1) livestock access to feeding and watering stations, and (2) continued access across the right-of-way for farm equipment.
3. Harassment of livestock is not permitted at any time during project construction activities.
4. Following hydrostatic testing, the test water would be discharged to dryland sites through dewatering structures constructed of silt fence and straw bales, or spray irrigated. The rate of discharge from the pipe would be controlled to prevent flooding or erosion.
5. Agricultural activities will be allowed on the permanent pipeline right-of-way.

Water Quality and Quantity / Fisheries

1. Hydrostatic test water and water used for dust suppression will be pumped from rivers and streams that contain sufficient flow so that the loss of water volume will not affect aquatic life or downstream water rights holders.
2. Water from hydrostatic testing will not be released back into streams.
3. Herbicides used for weed control will be applied according to the label instructions and by qualified personnel. Selection and orientation of spray units to avoid streams, and attention to the details of application to avoid drift, will minimize chemical entry into streams. Spray buffer strips will be used along streams to reduce or eliminate the effects of herbicide spraying on aquatic environments.
4. Stream, river, and other water shorelines would be restored insofar as practical to their original condition and contour. Boulders would be returned to their original locations and set to the original soil line.
5. During maintenance and repair activities, woody debris and other materials shall be left in stream channels or returned to stream channels to help enhance fish habitat.

General Construction Information

1. The Montana One-Call System would be used by the construction contractor to alert owners of the impending pipeline construction.
2. To the extent possible, all utilities would be notified well in advance of construction to incorporate their facility locations on the construction drawings. Prior to construction, utility lines would be located on-site, flagged and staked.

Right-of-way and Construction Easement

Landowners will be justly compensated for the value of land occupied by the permanent right-of-way, as well as for short-term use and damages associated with construction activities within the 100-foot-wide construction easement.

2.1.2.15 Selectively Recommended Mitigation Measures

1. To minimize erosion and sedimentation transport, temporary control measures (e.g. silt fences, straw bale fences, terracing, water bars, matting, settling ponds, or other erosion control techniques) may be installed prior to and during construction in graded or disturbed areas with steep slopes exceed 30% and in other sensitive areas.
2. To avoid sedimentation loading downstream and impacts to fisheries at specific stream crossings, trenching operations for the pipeline would occur through the stream during dry or low flow period.
3. For specified streams, flows would be diverted during pipeline cut and cover operations. Following placement of the pipeline in the streambed trench, the trench will be backfilled with the removed materials and the streambed and banks will be restored as near as

practicable to their original contour. Flow will be restored to the natural course as soon as possible.

4. Pipeline construction within ¼ mile of an active bald eagle, raptor or blue heron nests would occur only after the young have fledged. Monitoring of nest activity, as well as any other identified raptor nests, will take place prior to pipeline construction activities to determine timing of avoidance. At no time would any trees with raptor nests be cut down to accommodate right-of-way or easement clearing for construction activities.
5. Construction timing will be altered in specific areas to avoid sensitive periods.
6. Surveys would be conducted prior to construction in specific areas to identify the locations of special status species habitats. If any special status species were found, MPC would consult with U.S. Fish and Wildlife Service (USFWS) and Montana Fish, Wildlife, and Parks (MFWP) to avoid adverse impacts.
7. In areas where the pipeline crosses riparian zones, a compressed right-of-way may be used to minimize impacts to riparian areas and cultural resource sites.
8. Warning signs would be visibly placed upstream of waterway construction areas to warn recreationists of ongoing downstream construction activities.
9. Where possible the edges of clearing in forested lands or tree groves will be feathered to avoid abrupt, straight lines.
10. Warning signs and flag-persons would be used at all roadway crossings during pipeline construction for all state, federal, county, and local roads and highways, and appropriate detour routes identified for local road users.
11. All construction machinery would be cleaned and inspected before entering a wetland and vehicular traffic would be limited and restricted through wetlands. Once site reclamation is complete, no traffic across wetland areas would be allowed. The short-term duration of construction activities during the dry season, effective erosion control and soil loss prevention measures, prompt reclamation, and minimized disturbance zone associated with pipeline construction through wetlands areas, will minimize impacts to wetlands.
12. Pilot vehicles will be used where necessary to assist pipe distribution trucks negotiate curves and hills in mountainous regions.
13. If construction is not complete during work hours, all trenches across public roads will either be backfilled to grade or heavy steel plates will be placed across the trench and the location approximately marked with warning signs prior to the completion of the days work activities.

Boring pits will be located as far from the roadway as is practical. Safety precautions will be taken to protect workers and roadway users.

2.2 Proposed Action With Mitigation Measures Alternative

MEPA requires the DEQ to consider all reasonable alternatives that would support the purpose and need of the Proposed Action and are practical or feasible from a technical and economic standpoint. In a MEPA evaluation, reasonable alternatives to the Proposed Action may or may not be within the jurisdiction of DEQ to implement (ARM 17.4.617). This alternative provides an alternative means of implementing the Proposed Action described in Section 2.1.

The Proposed Action with Mitigation Measures Alternative (Mitigation Alternative) includes all activities described in Section 2.1 and additional mitigation measures described in this section. These “add-on” mitigation measures are analyzed for residual environmental effects in Section 4.2 of this EIS. Most of the measures described in this alternative address concerns raised by state agencies and the public during the scoping process (Section 1.7). Mitigation measures for this alternative are listed under three categories: measures addressing potential impacts from construction and operation of the proposed generation plant (CES), measures addressing potential impacts from construction of the proposed pipeline loops (MPC), and measures that are expected to be required by other agencies under separate permitting actions.

The following mitigation measures cannot be required by DEQ without a request from the project sponsor that they be placed in a permit. CES and MPC may request that any or all of the mitigation measures that pertain to expected impacts from their proposed activities be placed in the permits. Once CES or MPC has requested that a mitigation measure in this section be incorporated in a permit, it becomes mandatory and enforceable as part of the permit.

In those instances when the sponsor chooses not to include a mitigation measure in a state permit, and the project sponsor agrees to perform the proposed mitigation, the project sponsor can choose to work with the appropriate agency or entity to perform the action.

Since the following mitigation measures address choice on the part of the project sponsors, it is possible none of the proposed mitigation measures will be selected. If a mitigation measure is not selected, impacts from the Proposed Action that would have been mitigated would remain. Mitigation measures described under this alternative that are selected by the project sponsors will be identified in DEQ’s Record of Decision.

2.2.1 Generation Plant Construction and Operation Mitigation Measures

Measures described in this section were developed to mitigate impacts described in Chapter 4 from the activities proposed by CES. Mitigation measures are categorized by resource area.

2.2.1.1 Land Use and Visuals

Generation Plant Exhaust Stack Lighting

CES would provide the FAA with information regarding residential land uses surrounding the generation plant and industrial park, and identify preferred lighting for the exhaust stacks that does not include strobe lights.

2.2.1.2 Water and Fisheries

Maintenance of Adequate Instream Flow

CES would seek continuation of adequate instream flow rates in Warm Springs Creek by implementing one or both of the following:

- CES would initiate and support a process by which surface water rights holders in the Warm Springs Creek watershed (the basin) develop and comply with a Water Management Plan for the basin that adequately addresses minimum instream flows. CES would initiate the process in cooperation with the Montana Department of Natural Resources and Conservation (DNRC) at least one year before use of industrial process water begins. CES would support the process by providing adequate meeting space and an independent facilitator to identify and invite participation from interested water rights holders in the basin. The facilitator would work in cooperation with DNRC, Fish, Wildlife and Parks, and water rights holders that must include ARCO and the city and county of Butte-Silver Bow to develop a Water Management Plan to meet the following two goals: (1) First and foremost to manage releases from Silver Lake that would enable Lower Warm Springs Creek (below Gardner Ditch) to maintain no less than 16 cubic feet per second (cfs) for the critical fish-habitat period of April 1 through November 30, and (2) to enable Butte-Silver Bow to use all water rights allocated for development of the Silicon Mountain Technology Park.
- CES would augment flow in Warm Springs Creek, through negotiations with other water rights holders and management of process water withdrawal timings, that minimum instream flow conditions (at least 16 cfs below Gardner Ditch) are met in Warm Springs Creek from April 1 through November 30.

2.2.1.3 Vegetation

LAD

The project sponsor would include in the Weed Control Plan a provision to vegetate sprinkler discharge sites at the LAD with salt-tolerant species such as tall fescue and monitor the efficacy of salt removal via plant uptake. If loss of vegetation occurs, CES would modify the LAD operation and/or location to result in healthy vegetation.

Native Species Planting

The project sponsor would include in the Weed Control Plan a provision to plant native species in areas disturbed by project activities and not permanently occupied by project facilities.

2.2.1.4 Noise

CES would implement noise control measures at the generation plant such as silencers for decreasing noise generated during boiler steam blowout for plant start-up and maintenance.

2.2.2 Pipeline Construction and Operation Mitigation Measures

Measures described in this section were developed to mitigate impacts described in Chapter 4 from activities proposed by MPC. Mitigation measures are categorized by resource area.

2.2.2.1 Land Use

Apiary Sites

Prior to building of the gas pipeline, coordination should occur between construction activities and the beehive operators. It may be possible to relocate hives within the same apiary site; causing the hive to be situated in an area farther away from construction activities. Beekeepers typically rotate bees between apiary sites. Ideally, hives would be relocated to another registered apiary site during the period of pipeline construction.

Superfund Sites

Coordinate with ARCO to include pipeline construction and operation in the ARCO long-term Management Plan for wildlife conservation at the Warm Springs Pond Superfund Site.

2.2.2.2 Water and Fisheries

Placement of Construction Materials

No material would be left in the stream channel after completing construction activity.

Scour Protection

Unless otherwise required by the DNRC Floodplain Section, the 100-year depth of scour would be determined at each perennial stream crossing by a professional with expertise in river mechanics and sediment transport. Depths would be calculated on crossing specific and local hydraulic and geomorphic conditions.

Bank Erosion and Scour Protection

Unless otherwise required by the DNRC Floodplain Section, minimum pipeline burial depths at perennial stream crossings, as determined by the 100-year depth of scour times two calculation, would be extended laterally into the stream bank a distance beyond any bank erosion than can reasonably occur during a 100-year flood as determined by a professional with expertise in river mechanics and sediment transport.

Pipeline Cover Monitoring

MPC would arrange for the inspection of pipeline integrity and cover depth at perennial stream crossings on a routine basis (at least once a year) or immediately following a high flow event.

Silver Creek Crossing - Soils

MPC would ensure appropriate disposal of contaminated fill material, if present, such that fish are not affected.

Silver Creek Crossing - Method

MPC would employ a dry or trenchless stream crossing of Silver Creek.

Dearborn River Crossing

MPC would employ a trenchless or dry crossing of the Dearborn River. If a dry crossing, MPC would notify FWP with enough time to allow a FWP biologist to be present to conduct fish capture if necessary and would comply with FWP requirements regarding diversion structures, reseeding disturbed areas, whirling disease mitigation measures sand timing restrictions.

Dry or Trenchless Crossing

MPC would employ a dry or trenchless crossing of the Sun River, the Backwater of the Teton River, Jones Creek, Muddy Creek, Spring Creek, Big Coulee Creek and Flat Creek.

Fish Entrainment Protection

MPC would ensure that screen intake pipes for hydrostatic test water are installed with the smallest practicable screen to reduce risk of fish entrainment.

Whirling Disease Mitigation

MPC would require contractors to clean all equipment or other items used for in-stream construction that have been in a whirling disease contaminated stream to FWP standards for preventing the spread of whirling disease.

Stream Crossing Timing

Strictly adhere to timing windows recommended by FWP to ensure that streams are crossed at the least damaging period of year for impacts to fish.

2.2.2.3 Soil and Vegetation

Topsoil Salvage

Pipeline construction activities resulting in soil excavation would salvage the uppermost topsoil horizon(s) and stockpile the materials for reclamation coversoil after regrading. At a minimum, topsoil salvage depth would include all horizons dominated by organic material or containing an accumulation of organic matter to a depth of 12 inches.

Multiple Horizon Soil Salvage

For agricultural lands, soil and salvage operations would include multiple horizons (i.e. topsoil and subsoil) salvaged separately and replaced sequentially to help mitigate the potential loss of soil productively.

Soil Compaction Minimization

All salvaged coversoil would be respread over the regarded trench using tracked equipment to minimize soil compaction.

100-year Flood Plain

Temporary access roads would be located, to the maximum degree, on soils outside the 100-year floodplain.

Reseeding

MPC would include in the Weed Control Plan the provisions that all disturbed areas would be reseeded with site-adapted seed mixtures and adequate seed rates of pure live seed in the first appropriate season (Spring or Fall) after construction and at landowners discretion. Areas disturbed by the Project that supported native vegetation would be revegetated with native species.

Temporary Cover of Disturbed Areas

MPC would ensure that disturbed areas would be seeded with temporary nurse crops or cover-crops if construction is completed during the summer months (June through August) or at landowners' discretion.

Minimize Vegetation Cleanup

Existing vegetation would only be cleared from areas scheduled for immediate construction work and only for the width needed for active construction activities.

Revegetation Reclamation

MPC would monitor revegetated areas and implement remedial revegetation until reclamation is successful.

Botanical Surveys

The project sponsor would perform pre-construction botanical surveys of staging yards, contractor yards, and other associated facilities and mitigate if noxious weeds are not controlled in reclaimed areas.

Riparian Vegetation

The project sponsor would mow or cut, rather than blade, woody riparian and wetland vegetation to the extent practicable.

Riparian Reclamation

Plant comparable native woody species in all areas where woody riparian vegetation is disturbed and mitigate disturbances of high-quality riparian areas.

Special-Status Plants

The project sponsor would use narrowed right-of-way or, where possible, minor reroutes to minimize or avoid impacts to special-status plant populations.

Contractor Compliance

MPC would ensure contractors' adhere to all mitigation measures.

2.2.2.4 Pollution Prevention

Pollution Prevention

All vehicles and equipment utilized during pipeline construction would be clean, in good repair, and without leaks or oil, gasoline, diesel, or other materials which would contaminate stream water quality. The contractor or MPC would conduct daily equipment inspections for leaking oil and fuel.

2.2.2.5 Wildlife

Big Game Avoidance

MPC would consult with FWP to develop timing restrictions to avoid constructing in big game winter range during critical periods.

2.2.3 Mitigation Measures Expected to Be Required Under Separate Permitting Actions

In addition to mitigation measures developed by DEQ, other agencies are expected to require the following conditions under the authority of separate permitting actions. This section includes permit conditions expected to be imposed by the Lewis and Clark County conservation districts for stream crossings. Army Corps of Engineers conditions are listed in Appendix H.

2.2.3.1 General Permitting Conditions Adopted by Lewis and Clark County Conservation District (DNRC 1997):

1. Projects will minimize: (a) upstream and downstream adverse impacts, and (b) future disturbance to the stream.
2. Projects will manage and reclaim disturbed areas to minimize erosion.
3. Temporary structures will be designed to handle high flows, removed from stream channel at end of project, and area must be restored to a natural and stable condition.
4. Channel alterations must retain original stream length or otherwise provide hydrologic stability.
5. Stream bank vegetation must be protected except where removal is necessary for project. Vegetation removal will be kept to a minimum.
6. Riprap, rock, or other material must be of adequate size and shape and properly placed to protect stream bank from erosion.
7. District may: (a) limit project time and duration to minimize impacts to stream or aquatic life, (b) require applicant to submit engineering designs, or (c) require applicant to provide project completion documentation.
8. Unless specifically authorized by the district, the following are prohibited: (a) placement of road fill material in a stream, (b) placement of materials in a stream where it can erode or float back into the stream, (c) projects that permanently prevent fish migration, (d) operation of construction equipment in a stream, (e) excavation of streambed gravels, (f) construction of in-stream ponds, (g) construction of concrete retaining walls, (h) construction of multiple crossings in a single reach of a stream, and (i) placement of railroad ties, tires, snow fence, concrete debris, or other materials that could be construed as debris in a stream.

2.3 No Action Alternative

Under the No Action Alternative, the generation plant would not be built and upgrades to the MPC natural gas pipeline, including compressor stations, would not be constructed. The natural gas pipeline would not be built and MPC would not have the capability of providing sufficient natural gas for CES's Generation Project. The BLM, BOR and State of Montana would not issue the right-of-way grants or permits for the project.

2.4 Alternatives Considered but Eliminated from Detailed Study

Numerous operational and location alternatives to the proposed action were identified by the project sponsors. A wide range of alternative sites, routes, pollution control devices, waste disposal strategies, water supplies, fuels, equipment and facilities was considered. The alternatives described in this section were eliminated from further consideration for analysis because they were found to be unreasonable for detailed analysis based on the selection criteria listed under Section 2.0.

2.4.1 Generation Plant Alternatives Considered but Dismissed

Alternatives to the proposed generation plant described in Section 2.1.1 include the use of alternative water supplies, wastewater discharge methods, alternative water use methods, alternative sources of energy, alternative waste heat management, and alternative sources of fuel. These alternatives and the criteria for elimination from further analysis are described in the following subsections.

2.4.1.1 Alternative Water Supplies

CES considered use of groundwater to supply process water for the generation plant. The alternative was considered but dismissed because the city and county of Butte-Silver Bow preferred use of their existing surface water supply by pipeline rather than groundwater extraction at the TIFID. In addition, CES determined that groundwater supplies may not be adequate to support the process water needs of the proposed plant. This alternative was eliminated from further consideration because it conflicts with local resource management plans and may not provide adequate process water for the generation plant.

Recycled water from the wastewater treatment plant was also considered by Butte-Silver Bow as a supply of water for industrial users. This alternative was eliminated due to high cost and because the quantity and quality of available water would be regulated by a TIFID or individual tenant treatment facility.

2.4.1.2 Wastewater Discharge Alternatives

Injection of wastewater into the ground in the TIFID area, either in conjunction with other tenants or by CES alone, was considered impractical because of the large volume of water involved. The injection method could also not result in minimizing environmental impacts by potentially causing adverse impacts to the surrounding ground water in the Butte-Silver Bow area. Current injection in the area was discontinued in 1996.

Temporary piping of effluent discharge to a dry gulch and or pumped over the Continental Divide to a dry acceptable location was considered as an option for wastewater discharge. This alternative was eliminated from further consideration because of the high cost associated with piping and lands, high maintenance costs, the prohibitively higher expense required for pumping effluent to a higher hydraulic gradient, and because discharging water from the Columbia River drainage into the Mississippi River drainage is discouraged by federal and state agencies.

Constructing and operating joint-use water and wastewater treatment facilities within the TIFID was considered, and in fact have been considered for many years by Butte-Silver Bow officials. Studies are ongoing with the Butte-Silver Bow to consider alternatives and addendums to the master plan. It is considered cost prohibitive for the TIFID to supply services for specific or individual needs in the industrial park. This alternative would still require a means of effluent discharge, and in this instance, would require several discharge wastewater points. This is not a viable economic or practical alternative due to the logistics of discharging waste streams, and the time required to develop this alternative would not meet the purpose and need for the Proposed Action.

2.4.1.3 Water Use and Consumption Alternatives

Methods to reduce water consumption were considered in the design process of the generation plant when choosing the cooling systems to be used at the plant. All systems as described in Section 2.2 were designed to optimize the amount of necessary makeup water required. The following options were considered but dismissed from further consideration for the reasons stated below:

- A once-through cooling tower design was considered. This alternative was eliminated because of the need for a large water supply simply for cooling water purposes. It would have also created the potential for thermal pollution in the discharge waters.
- Air-cooling was considered as an alternative to water-cooling. Air-cooling would require more land to be purchased for the larger condenser and additional equipment necessary. This alternative was eliminated because of the increased costs involved for more expensive equipment, less efficient electrical output, and additional land requirements.

2.4.1.4 Waste Heat Utilization Alternatives

Waste heat from the thermal excess in the cooling water cycle(s) was considered for heating hotel loads (i.e., in house facility uses) and as a possible future supply to other TIFID tenants. The uncertain resources required to dissipate the waste heat loads in the summer season requires a back up cooling methodology to be implemented to ensure there is a means to continue power generation. This could more than double the costs associated with an alternative waste heat cooling system. This alternative was eliminated due to the uncertainty of tenant needs, the large amount of piping, pump stations, controls, maintenance, and the economics of payback for initial installation.

2.4.1.5 Alternative Fuels

The following alternative fuels were considered and eliminated because they would require the building a processing plant or extensive facilities to transport fuel or prepare fuel for use in the plant. In addition, much of the major natural gas pipeline infrastructure to transport gas to the facility is already in place and with looping upgrades and a tap line, the system would reliably support the facility's needs.

- Alternative fuel supplies such as solid and liquid types ranging from hard to soft coal and various grades of oils were ruled out due to the design chosen for the gas turbines.
- Liquified natural gas and propane or butane fuels were considered but dismissed as impractical and too expensive because they require extensive storage facilities and would cause a problem with transportation logistics.
- Synthetic fuels such as synthetic-gas, coal gas, ethanol and oil emulsion were also considered for possible import or on-site storage. These were eliminated from consideration due to the lack of transportation methods, dependability problems, and future availability of sufficient quantities.

2.4.2 Pipeline Alternatives Considered But Dismissed

The following sections describe the alternatives considered and eliminated for the Montana Power Natural Gas Pipeline Project (Pipeline Project):

- Pipeline Route Alternatives
- Pipeline System Alternatives
- Compression and Pipeline Combination Alternatives

Alternatives evaluated in detail include the Proposed Action and the No Action Alternative. The description of the Proposed Action includes the location, design, construction methods, scheduling and cost. This is followed by a description of generic and selectively recommended mitigation measures planned to eliminate potentially significant adverse impacts.

2.4.2.1 Pipeline System Alternatives

Four alternative routes, or other pipeline systems, were considered and eliminated. Table 2-7 compares the four alternatives with the Proposed Action (Carway — Mainline) based strictly upon new pipeline construction, exclusive of compression. Each alternative would require a combination of 12", 16" and 20" diameter pipeline and construction costs are calculated based upon a "rule-of-thumb" estimate of $25,000/inch-mile of pipeline.

Table 2-7 Summary of Mainline Expansion Alternatives

Alternative	Carway-Kalispell	Elko	Carway-Mainline*	Aden-Mainline	Loomis
Source-to-Plant Flow Path (miles)	390.0	321.0	263.0	275.0	268.0
New (Virgin) Pipeline Construction (miles)	149.5	231.6	17.6	17.6	17.6
Existing (Looped) Pipeline	122.6	11.3	94.0	94.0	226.1

Alternative	Carway-Kalispell	Elko	Carway-Mainline*	Aden-Mainline	Loomis
Construction (miles)					
Total Pipeline (miles)	272.1	242.9	111.6	111.6	243.7
Pipeline Cost ($million)	118.8	115.8	54.0	54.0	102.1

* Proposed Action

Evaluating the alternatives with the information presented in Table 2-7 shows clearly that the Proposed Action is the least costly alternative and presents the least risk to the environment through surface disruption. This conclusion is based upon a minimization of costs and environmental impact to "virgin" right-of-way (ROW) corridors. Because sufficient supply currently exists behind the Carway receipt point, as opposed to the Aden receipt point, and MPC proposes to receive the gas supply from Carway, Alternative #3 – Carway/Mainline is the alternative chosen by DEQ for detailed consideration. Refer to Figure 2-14 for a map showing location of the alternative systems identified in Table 2-7.

2.4.2.1.1 Carway / Kalispell

Carway is an existing MPC receipt point that interconnects the TransCanada's Alberta System (NOVA) to the MPC natural gas transmission system. Current takeaway capacity on the MPC system is approximately 100 Mmcfd from the Carway point in this alternative. The flow path of the gas delivered from Carway would be Carway to Browning to Kalispell to Missoula to Morel to the generation plant. This route would require looping of the existing MPC Kalispell line, as well as a new virgin pipeline to be routed from Kalispell to Missoula. It also would require some looping of the existing Deer Lodge (Morel) to Missoula pipeline (See Figure 2-14).

2.4.2.1.2 Elko, B.C.

Elko would be a new MPC receipt point that interconnects the Alberta Natural Gas (ANG) pipeline to the MPC natural gas transmission system. This route would tap the existing ANG pipeline near Elko, British Columbia and route a virgin pipeline from Elko to Roosville at the US-Canada border near Eureka. The flow path of the gas delivered from Elko would be Elko to Roosville to Kalispell to Somers to Missoula to Morel to the generation plant. The "virgin" route would continue from Roosville to Eureka to Kalispell. A new line would have to be built from Kalispell to Missoula. It would also require some looping of the existing Deer Lodge (Morel) to Missoula pipeline (See Figure 2-14).

2.4.2.1.3 Carway / Mainline (Proposed Action)

Carway is an existing MPC receipt point that interconnects the NOVA to the MPC natural gas transmission system. Current takeaway capacity on the MPC system is approximately ~100 Mmcfd from the Carway point. The flow path of the gas delivered from Carway would be Carway to Cut Bank to Mainline#3 to Silver City to Morel to the generation plant. This alternative would utilize the existing MPC pipeline infrastructure by using the current flow path to increase flows from Canada to the SBG plant. It would require looping from Cut Bank to Mainline#3, looping from Mainline#3 to Helena and an additional mainline compressor station (See Figure 2-14).

2.4.2.1.4 Loomis

Loomis is an existing delivery point on the Havre Pipeline (HPL) gas transmission system that interconnects the TransGas' Many Islands Saskatchewan system to the MPC transmission system. Current takeaway capacity on the MPC system is 30 Mmcfd from the interconnection between HPL and MPC at Blaine County #3. The flow path of the gas delivered from Loomis would be Loomis to HPL Blaine County #1 to HPL Blaine County #3 to MPC's South Bear Paw System to Big Sandy to Great Falls to Mainline#3 to Silver City to Morel to the generation plant.

This scenario would require reversing flow on the HPL pipeline system that was originally designed to flow south to north and into Canada. The Havre Pipeline system was built in the 70's to take Montana gas reserves in the prolific Tiger Ridge area to the mid-west. The system takes the Montana gas northward to Saskatchewan, tying into the existing Canadian infrastructure for re-delivery to the US in Minnesota. In addition to reversing the traditional flow path, looping would be required on the MPC South Bear Paw system and the MPC Big Sandy-Great Falls line. Further looping would be required from MPC's Mainline#3 to Silver City (See Figure 2-14).

2.4.2.1.5 Aden / Mainline

Aden is an existing MPC receipt point that interconnects PanCanadian's southeast Alberta gathering and transmission system to the MPC natural gas transmission system. Current production available at Aden is 40 Mmcfd; this represents less than 50% of the Generation Project's daily gas supply requirements. From an expansion facility perspective, this alternative is relatively similar to the Carway/Mainline alternative. However, although the MPC Aden and Carway lines are both 16" diameter and similar lengths, the Carway line has higher operating pressures and subsequently higher capacity. The flow path of the gas delivered from Aden would be Aden to Cut Bank to Mainline#3 to Silver City to Morel to the generation project. This alternative would utilize the existing MPC pipeline infrastructure by using the current flow path to increase flows from Canada to the Generation Project. It would require looping from Cut Bank to Mainline#3, looping from Mainline#3 to Silver City and at least two additional compressor stations (See Figure 2-7).

2.4.2.2 Alternative Compression and Pipeline Combinations

MPC considered several combinations of compression stations and pipeline loops to develop the pipeline project as described in the Proposed Action (Section 2.1). This section describes the criteria used for the design of the MPC pipeline project.

2.4.2.2.1 Compressor Stations

As gas flows through a pipeline, its pressure is reduced due to friction. This pressure reduction is called pressure drop. The greater the flow rate, the greater the pressure drop for a given segment of pipeline. To mitigate the impacts of pressure drop, compressor stations are installed which act as pressure "boosters" and effectively pump the gas down the pipeline.

Compressors are designed to boost the natural gas pressure up to the maximum allowed operating pressure (MAOP) of the pipeline. This MAOP is determined by the physical properties of the pipe and is governed by the design formula in the federal pipeline safety regulations. Each segment of the MPC gas transmission system has a unique MAOP based on the specific physical properties of the pipe. The compressor stations then are limited to a discharge pressure governed by the MAOP of the downstream pipeline. For an existing natural gas transmission system, the flow or capacity can be increased by increasing the pressure at the discharge of a compressor station until MAOP is reached.

As gas flows through the pipeline and toward the next compressor station, some of the pressure is lost due to friction (pressure drop). The next subsequent compressor station then re-compresses the gas back up to MAOP and discharges it into the next segment of downstream pipeline. This sequence of pipelines and compressor stations allows for a system that can have smaller diameter pipe than what would otherwise be required to flow the same volume of gas all the way from the source to the load with no compression.

2.4.2.2.2 Pipeline

Pipeline looping can be defined as the addition of another pipeline in the same corridor as the first pipeline and provides the opportunity to flow the gas in parallel through two pipes instead of one.

Looping pipelines is an extremely cost-effective way of increasing system capacity. In addition to being cost effective, looping is efficient because an incremental capacity increase can be obtained by looping only a portion of the downstream line. This allows a designer to “fine tune” capacity increases by varying the length of the pipeline loop and also “follow” increasing capacity requirements by looping a pipeline in segments. Most major pipeline facilities utilize looping as method of increasing capacity. Because of the need to utilize the existing pipeline infrastructure to add capacity by looping, the locations of any loops are necessarily restricted to the existing pipeline corridors. These loops are generally built between existing mainline block valves.

2.4.2.2.3 Compression and Pipeline

Once the compressor station is discharging at MAOP, no additional gas can be pumped down an existing pipeline, therefore, the only way to increase the downstream capacity is to loop the downstream pipeline. When a pipeline downstream of a compressor is looped, the required compressor discharge pressure decreases for a given flow rate. Alternatively, when looped, the downstream capacity is increased for the same compressor discharge pressure. As the downstream capacity is increased, the upstream compression horsepower requirements are also increased since the required amount of compression depends on the station flow rate.

Again, the downstream capacity of an existing system is reached when the upstream compressor station discharges at MAOP. Downstream loops are added followed by larger amounts of horsepower. When the downstream pipeline is looped for 100% of the distance to the next compressor, and the upstream compressor is discharging at MAOP, its time to add a third loop. The need for the third loop can be further pushed out in time by looping with larger diameter pipe.

Typically in growing systems, pipeline loops are at least the same diameter as the original line and usually larger.

In order to minimize volume and pressure “surge” along a pipeline, loops are generally installed immediately upstream and downstream of compressor stations. These loops, when in close proximity to the compressor, provide a volume “bottle” to dampen pressure gradients during start and stop conditions. This allows for smoother pipeline operations under transient flow conditions.

It is also cost effective to plan for contiguous loops when possible, to minimize construction costs. The construction of longer continuous loops avoids pipeline contractor “move-arounds” and remobilization costs.

2.4.2.2.4 Optimization and Economic Analysis of Incremental Capacity Additions

Once incremental capacity requirements for a system have been determined, flow capabilities on the system are evaluated using a system hydraulic flow model that calculates pressures, flows and compression requirements based on the physical geometry of the system. This model helps identify where capacity restrictions occur. Pipe sizes, operating pressures, and routing as well as compressor station sizing and location are evaluated to determine the potential ways to eliminate any capacity restrictions. The possible combinations of pipe location, size, and compressor location and size are almost unlimited. Engineering judgment and experience play a key role in determining new pipe sizes, lengths and compressor requirements.

Preliminary site and route selection areas are defined by hydraulic parameters. The reasonable alternative routes between endpoints of the new pipeline define preliminary routes for new pipelines. The locations of loops of existing pipeline segments are often restricted, for practical purposes, to areas along existing pipeline routes and between existing block valves. It is also useful to loop existing pipelines in established pipeline corridors to minimize environmental, land use and aesthetic impacts.

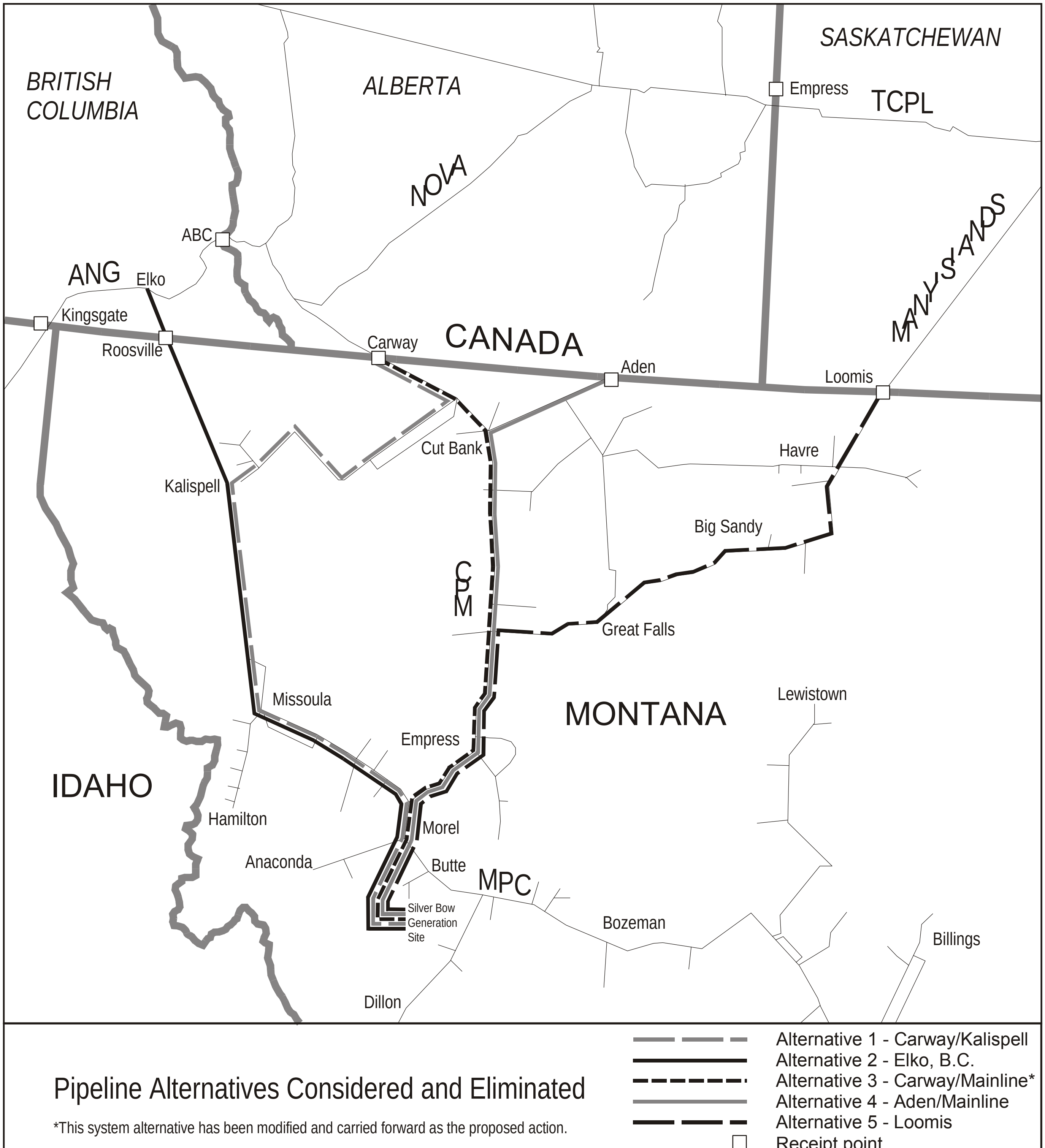


Figure 2-14 Pipeline Alternative Routes

The above described design and optimization process was followed to meet the fuel supply needs of the Generation Project. As a result, the Mainline expansion design (Proposed Action) was developed and consists of the following:

2.4.2.2.5 Derivation of the Proposed Action

Lengths of the individual loops are Choteau – 39.8 miles, Wolf Creek – 34.8 miles, and Silver City – 5.2 miles. All of this loop mileage will be constructed in the same corridor as the existing 16" Mainline. Approximately 20.2 miles of this pipeline loop would require new right-of-way and the remaining 59.7 miles would be constructed on existing pipeline right-of-way of the decommissioned MPC 20", 1931 vintage pipeline.

The loops are located such that they:

- utilize existing pipeline right-of-way corridors
- begin and end at existing 16" Mainline block valves
- provide looped pipeline segments immediately upstream and downstream of all compressor stations to mitigate pressure transients
- facilitate the lowest costs by constructing long contiguous segments
- avoid difficult (and costly) terrain
- provide sufficient hydraulic capability to satisfy the Generation Project load

Compression

- 13,600 horsepower gross (11,400 horsepower net) of additional compression will also be required to serve the Generation Project. The compression additions will occur at three locations:
- Mainline #1 – a replacement of two existing Cooper-Superior compressor 1,100 Hp units with two, 2,000 Hp units resulting in a net increase in station horsepower of 1,800 Hp
- Mainline #3 – an addition to the existing station of three 1,600 Hp Solar Saturn units for an increase of 4,800 Hp
- Mainline #4 – a new grassroots compressor facility consisting of 1,600 Hp Solar Saturn units for a station horsepower of 4,800 Hp.

Tap Line

The new 16' tap line would extend 17.6 miles from Morel Junction on the Mainline to Generation Project. The tap line will require new right-of-way for the entire line.

2.4.2.3 Alternative Needs of Construction Work Force

Alternatives to meet the service needs of the construction work force were considered. The possible construction of work camps at the construction sites was eliminated when it was determined that there would be insignificant adverse impacts on local communities. The needs of the work force would not tax the existing quality and quantity of services available to local residents. There are ample facilities close at hand in Butte to support a work force both temporarily and permanently for the generation facility. There are ample facilities in Helena and other communities in the vicinity of the pipeline to support a work force needed for construction.